

# The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

VOL. XX. No. 510

APRIL 6, 1929

Prepaid Annual Subscription:  
United Kingdom, £1.5; Abroad, £2.2.

## Contents

	PAGE
EDITORIAL NOTES: I.C.I. Works Councils; The Manchester Meeting; Flotation Fundamentals.....	329
The Production and Uses of Tartaric Acid, by Dr. G. Malcolm Dyson .....	331
Corrosion in Steam Boilers .....	334
From Week to Week .....	337
References to Current Literature .....	338
Patent Literature .....	339
Weekly Chemical Prices and Market Reports.....	342
Company News .....	346
Commercial Intelligence; New Companies Registered; Chemical Trade Inquiries .....	348
MONTHLY METALLURGICAL SECTION: Arsenic: Its Occurrence, Properties and Applications; The Electrodeposition of Cadmium for Rust Prevention (concluded), etc. ....	25-32

**NOTICES:**—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

The prepaid subscription to THE CHEMICAL AGE is 21s. per annum for the United Kingdom, and 26s. abroad. Cheques, Money Orders, and Postal Orders should be made payable to Benn Brothers, Ltd.

Benn Brothers, Ltd., proprietors of THE CHEMICAL AGE, have for some years past adopted the five-day week, and the editorial and general offices (Bouverie House, 154, Fleet Street, London, E.C.4) are closed on Saturdays.

Telegrams: "Allangas, Fleet, London."

Telephone: City 0244

## I.C.I. Works Councils

AN incidental, but really impressive, demonstration of the vastness of the Imperial Chemical Industries organisation will be supplied this month in London. On Friday, April 19, by invitation of the directors, the 900 members of the I.C.I. Works Councils will attend an inauguration meeting at the headquarters office at Millbank, and the occasion is rightly described in the *I.C.I. Magazine* as marking a red letter day in the history of the company. The chairman (Lord Melchett) is understood to be most anxious to welcome the newly-elected members personally, and also to have the opportunity of addressing them on the important scheme they will shortly be putting into operation. The Works Councils, as the official organ states, will thus have a splendid send-off, and members will not only have the personal satisfaction of being brought into direct touch with the chairman and directors at the very outset, but will be able to gather, during their inspection of the headquarters building, some idea of the size of the undertaking to which they belong.

This visit of the Works Councils to London, we are told, has been arranged for the day following the annual

meeting of shareholders, so that members may receive from the chairman himself prompt and first-hand information about the progress of I.C.I. in all its branches during the past year. It is officially announced that letters have been received by the company from a number of trade unions expressing their intention to co-operate with the Works Council scheme by submitting nominations. In this connection the *I.C.I. Magazine* points out that the work of the councils will in no way infringe upon subjects that have customarily been questions for negotiation with the trade unions, nor will their existence in any way lessen the feeling of goodwill existing between I.C.I. and these bodies.

All this points to a very satisfactory understanding between directors, shareholders, employees, and labour organisations. Lord Melchett has taken an honourable and influential part in promoting peace and co-operation in industry, and we believe that the shareholders, while naturally concerned about the return on their own capital, would like to feel that Imperial Chemical Industries are doing something to set a standard for British industry generally. There is good ground for hoping that this idea will be fully realised, and that I.C.I. will not only be known as a successful undertaking from the shareholders' point of view, but will be recognised as a national example in the right use of chemical and engineering science, of organisation, of raw materials, and of labour.

## The Manchester Meeting

THE arrangements so far announced for the annual general meeting of the Society of Chemical Industry, which is to be held in Manchester during the week beginning Monday, July 8, promise a gathering in which a bare sufficiency of serious features will be agreeably supplemented by visits to works, luncheons, dinners, receptions, garden parties and dances. Manchester, of course, is not primarily a centre of fashionable society, but it has a habit of thoroughly enjoying itself when it sets about the task, and it has claims that not many cities can equal on the interest of the business man, the scientist, and the educationist.

The Manchester meetings are to be held in the College of Technology. The annual general meeting on Tuesday, July 9, will include the presentation of the Society's Medal to Sir Richard Threlfall, and will be followed by the address of the President, Dr. Arthur D. Little, of New York. There will be papers, which the preliminary announcements assure us in advance will be "original" (though we trust all the Society's contributions might be so described), on Wednesday, July 10, and an address by Sir Richard Threlfall on Thursday, July 11. The more general features include works visits, a garden party given by

Dr. and Mrs. Levinstein, the annual dinner, and a reception by the Court of the University. The hotel arrangements are in the hands of Mr. A. McCulloch, College of Technology, Manchester, the hon. secretary of the Manchester Section.

### "Flotation Fundamentals"

THE application of the flotation process in metallurgy has, as is well-known, resulted in the recovery of metals of considerable value that would otherwise have been lost. A continuous study of advances in the art of flotation is conducted by the United States Bureau of Mines, which has made useful contributions to the development of this process and its successful application in the treatment of various types of low-grade and metallurgically difficult ores. In addition to the bulletins already noticed, two publications containing the results of recent investigations have been issued by the University of Utah as Technical Papers 4 and 5 in a series of reports on the subject of "Flotation Fundamentals."

Technical Paper 4, by A. M. Gaudin and Paul M. Sorensen, gives the results of tests on the flotability of pure chalcocite. They represent an extensive investigation of the effect of various collectors and depressors. Complete depression of chalcocite is accomplished by the addition of small quantities of thiosulphate, sulphite, sulphide, ferrocyanide, or ferricyanide ions. Some reagents react with the collector in such a way as to destroy its usefulness and should be avoided. The effects of some common anions are discussed. Anions that form insoluble copper salts inhibit the flotation of chalcocite.

Technical Paper 5, by A. M. Gaudin and J. Sheldon Martin, describes the flotation of malachite and azurite. It is found that malachite and azurite can be floated from a siliceous gangue by means of suitably selected saturated fatty acids and fatty acid soaps, which, however, will not effect a separation of the carbonates of copper from a calcite gangue. Failure of the fatty acids and fatty acid soaps, in the flotation of malachite and azurite from calcite, has been shown to be due to the acid condition of the circuit, which results in copper and calcium ions being present in the solution, causing the formation of identical surfaces on both the copper and the calcium carbonate particles. Several nitrogen-containing organic substances, such as amines and hydrazines, have been investigated as collectors of malachite and azurite. These compounds will float the carbonates of copper from calcite, but relatively large amounts are required. Organic nitrogen-sulphur reagents, such as the thio-carbonates, are more powerful collectors of malachite and azurite than are compounds containing nitrogen but no sulphur.

The effect of a large number of xanthates, and other thio-carbonates, on the flotation of malachite and azurite from calcite, and other common gangue minerals, without previous sulphidising, has been investigated. It has been shown that the xanthates and thio-carbonates collect as a result of the formation of insoluble copper compounds with the copper carbonates by chemical reaction rather than by adsorption of the reagent molecules on the mineral surfaces. Malachite and azurite may be floated from calcite,

and other gangue minerals, by means of relatively small amounts of suitably selected xanthates and other thio-carbonates. Temperature, time of conditioning of the mineral with reagents, and grain size are important factors affecting the flotation of the copper carbonates with the xanthates and thio-carbonates. An investigation of the effect of several organic hydrosulphides has shown that this type of reagent can be used to float malachite and azurite from calcite and other gangue minerals. The organic hydrosulphides are collectors of malachite and azurite by reason of the fact that insoluble copper mercaptides are formed on the surface of the copper carbonate particles by chemical reaction involving the replacement of hydrogen by copper in the hydrosulphide molecule. The amount of reagent required in floating the copper carbonates depends to a large extent upon the quantity of copper carbonate present.

The results of this investigation seem to indicate that copper carbonate ores may be concentrated by flotation by the use of suitably selected thiocarbonates (xanthates), or by means of organic hydrosulphides (mercaptans). It should be borne in mind that the freshness and purity of the mineral used in investigations of this character must be known before any dependence can be put on results obtained and interpretations made. Differences in the behaviour of minerals from different localities, and in different ores, may largely be the result of variations in the freshness or cleanliness of the surfaces of the mineral grains. Technical Papers 4 and 5, relating to "Flotation Fundamentals," may be obtained from the University of Utah, Salt Lake City, Utah, for 25 and 35 cents, respectively.

### Books Received

PERFUMES, COSMETICS AND SOAPS, Vol. II. By William A. Poucher. London: Chapman and Hall, Ltd. Pp. 521. 25s.

### The Calendar

Apl. 8	Ceramic Society: "A Double Chambered Fruit Kiln fired with Producer Gas." H. Hall. "Chrome Phosphate Colours." R. Winkle and W. G. Fitchford.	Stoke-on-Trent.
8	Society of Chemical Industry (Yorkshire Section): Annual General Meeting. Continuation of the discussion on "Hardness."	Hotel Metropole, Leeds.
9	Institution of Petroleum Technologists. 5.30 p.m.	John Street, Adelphi, London.
10	Institute of Fuel: "Fuel Economy and the Small Steam User." W. F. Goodrich.	London.
11	Oil and Colour Chemists' Association: "Some Optical Properties of Paints and Pigments." F. C. Toy. 7.30 p.m.	30, Russell Square, London.
11	Institute of Metals (London Section): Annual General Meeting. 7.30 p.m.	83, Pall Mall, London.
12	Society of Chemical Industry (Manchester Section): Annual General Meeting. "Suggestions in Steam Raising." T. R. Wollaston. 7 p.m.	Engineers' Club, 17, Albert Square, Manchester.
12	Society of Chemical Industry (Birmingham Section) and Chemical Engineering Group: "The Design and Operation of Gas Heated Furnaces." Dr. C. M. Walter.	Engineers' Club, Waterloo Street, Birmingham.
12	Oil and Colour Chemists' Association (Manchester): Annual General Meeting.	Manchester.

## The Production and Uses of Tartaric Acid

By G. Malcolm Dyson, Ph.D., A.I.C.

*A short time ago, Dr. Dyson dealt in these columns with citric acid. In the following article he deals with tartaric acid, the industrial importance of which should lend great interest to what appears below.*

TARTARIC acid, which is an indispensable industrial chemical, derives its name from the Arabic "tartir"—a word which signified "a deposit," and could be used in several connections. Thus, in the original Arabic it meant not only the deposit obtained from wine, but also, as in more modern times, the deposit which surrounds the teeth, whilst the iatro-chemist Paracelsus used the term "Tartar" in two senses—to describe wine deposits and also the concretionary masses deposited in the kidney and liver during the disease of those organs and usually referred to as "stone."

The actual conversion of tartar from wine into its characteristic acid was the subject of Scheele's first communication to the Stockholm Academy, while the non-appearance of this memoir in print was the subject of Scheele's quarrel with Bergmann and Retzius. It is of interest to note, also, that the manufacture of tartaric acid on a comparatively large scale followed on the publication of Scheele's paper with very little delay, until, at the present time it is the basis of a considerable and widespread industry.

### Occurrence of Tartaric Acid

The actual occurrence of tartaric acid is limited to the juices of various fruits, notably the grape and the tamarind. In the case of the grape, the tartaric acid passes into the expressed juice, and during the fermentation and subsequent maturing of the wine it accumulates in the various raw materials which are ultimately worked up into tartaric acid or its salts. Thus, during the fermentation there is deposited a quantity of insoluble material—mainly, acid potassium tartrate—which forms the "lees." After fermentation, the wine may be either matured for sale as such, or, if of suitable quality, may be distilled for brandy. During the process of maturing, a further quantity of acid potassium tartrate is deposited on the sides of the containing barrel, and this deposit constitutes the main source of commercial tartaric acid. It goes under the name of "argol," contains about 75 per cent. of potassium hydrogen tartrate, and grows on the casks at the rate of about 1 mm. per annum. Obviously, then, the wine-growers do not remove the argol every year, and it is interesting to note the fluctuations in the amount of argol offered for sale and the state of the wine harvest.

On an average, about 10,000 tons of argol come into the market every year, but in years when the harvest is scarce and of but little quality, or on rare occasions when it is very plentiful and prices rule extremely low, the producers scrape the casks for argol in order to augment their receipts for the year. Thus, in 1922, when a very large harvest of somewhat mediocre wine caused very low prices, over 12,000 tons of argol were offered; while in good wine years the offers fall as low as 8,000 tons. The figures just given apply only to the French and Algerian output; some idea of the magnitude of the industry can be obtained from the fact that in Sicily alone, in 1920, over 150,000,000 gallons of wine were produced, the lees and argol from which were converted to tartaric acid and cream of tartar. The values of the various argols and lees of commerce are indicated below.

Locality of Origin.	Total Acid.		Calcium Tartrate.	
	Per cent.		Per cent.	
Italian .. .. .	..	20-30	..	5-6
French .. .. .	..	20-25	..	..
Hungarian .. ..	..	16-22	..	0-8
Rumanian .. ..	..		..	
Grecian .. .. .	..	30-42	..	..
Turkish .. .. .	..		..	
Spanish .. .. .	..	20-35	..	5-15

The calcium tartrate mentioned in the table arises from a practice known as the "plastering" of wine, namely, the addition of calcium sulphate in order to facilitate its clearing, and often to brighten wine which has a slightly "off" colour.

### Acid Content of Raw Material

In order to extract the tartaric acid, it is necessary to know the exact acid content of the raw material, and, indeed, the raw material is bought and sold purely on its acid content. A standard method of estimation of tartaric acid is, therefore,

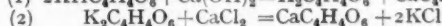
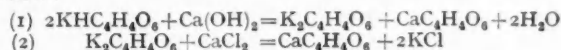
an essential feature of business in tartrates. The method due to Goldenberg is adopted by many, and gives uniform satisfaction. The raw material is taken (6 g. if the amount of potassium hydrogen tartrate is above 45 per cent.; 12 g. if it is below that figure) and digested with 18 c.c. of hydrochloric acid (density 1.1) for ten minutes, after which the solution is made up to 200 c.c. and filtered through a dry paper, rejecting the first few c.c. of the filtrate. The clear filtrate (100 c.c.) is now boiled for twenty minutes with 10 c.c. of 66 per cent. potassium carbonate solution, again cooled, made up to 200 c.c., and filtered. 100 c.c. of the filtrate is heated in a shallow porcelain dish with 3 c.c. of hydrochloric acid (density=1.1) for 15 minutes, made just alkaline to phenolphthalein with 10 per cent. potassium hydroxide solution and concentrated to about 40 c.c. Potassium chloride (5 g.) and acetic acid (5 c.c.) are now added, and the whole stirred for five minutes while the potassium acid tartrate separates out. The granular precipitate is filtered off on a Gooch, washed with a special solution and weighed as potassium bitartrate. The washing solution is obtained by dissolving cream of tartar (1 g.) in 800 c.c. of water, adding 4 c.c. of 40 per cent. formaldehyde and 200 g. of potassium chloride, making up to 1,000 c.c., and filtering.

Other raw materials for the preparation of tartaric acid comprise the marc left after the expression of the grape juice, or after the distillation of brandy; the "sarmenta" or leaves, tendrils, etc., of the grape vine, and tamarinds.

### Production of Tartaric Acid from Lees or Argol

The lees or argol is dried at 110° C. in a rotary kiln drier in order to stop bacterial decomposition. In this connection, it is of interest to mention that the spoilage of wine itself is principally concerned with the bacterial or fungal decomposition of the tartaric acid which it contains. The acid is converted first to tartronic acid, and then to a mixture of propionic, acetic and lactic acids. The dried argol is usually put through a steam-heated ball mill to convert it to a fine powder. Chemically, the methods used for the production of tartaric acid invariably involve, as the first step, the production of calcium tartrate. This stage may be performed in several ways, the aim being to produce a maximum yield of the tartrate whilst avoiding contamination with either iron or phosphates. There are three main methods of working up the crude acid potassium tartrates:—(a) The lime-chloride process, (b) the hydrochloric acid process, and (c) the Rochelle salt process.

In the first of these processes the argol is boiled with water and milk of lime. The milk of lime can be replaced by ground gypsum, but the boiling must then be carried on for several hours longer in order to complete the decomposition. In any case, the reaction proceeds according to the first equation below:—



From the first equation it is seen that only half of the tartaric acid has been converted to calcium tartrate. In order to complete the conversion, the potassium tartrate is decomposed by the addition of calcium chloride solution, after which, of course, the calcium tartrate may be filtered off.

In the second, or hydrochloric, process the decomposition is carried out in a much shorter time. The crude acid tartrate is filled into an autoclave with sufficient dilute hydrochloric acid to decompose all the tartrate, and the whole is heated up by forcing in live steam. The pressure and length of heating depend upon the nature of the crude material. Thus, with a Hungarian argol of low quality, four hours' heating at four atmospheres is required, a better quality French argol requiring only two to three hours' heating at three atmospheres. The mixture obtained by this process is filtered through pitch-pine filter presses provided with jute or camel hair cloths to withstand the action of the acid. The clear liquor is neutralised with milk of lime until the mixture is just acid to litmus. This incomplete neutralisation prevents the precipitation of calcium phosphate and any iron that may be present. The Rochelle salt process of extraction is used almost exclusively



for the preparation of cream of tartar, and will be described under that heading.

#### Conversion of Calcium Salt to Acid

The conversion of the calcium tartrate to tartaric acid is a comparatively simple process, resembling in its details the corresponding process with calcium citrate (see *THE CHEMICAL AGE*, p. 528, June, 1928). The press cake of calcium tartrate is suspended in hot water contained in a large lead lined pan and agitated by steam jets. Sulphuric acid of 60 per cent. strength is slowly run in. The exact amount of acid required for this stage must be ascertained by methods of trial and error. Samples are withdrawn from time to time, 5 c.c. being added to 50 c.c. of calcium chloride solution and heated on the water bath. As soon as a faint white precipitate is obtained after ten minutes heating in this manner, it is an indication that 0.2 per cent. of free sulphuric acid exists in the main batch. Sufficient calcium tartrate is added to remove this trace of mineral acid, the calcium sulphate allowed to settle, and the clear liquid siphoned off into lead-lined evaporators. The liquid at this stage has a density of about 10° Bé., and evaporation (best carried on in multiple effect vacuum stills) is continued until the density rises to 30° Bé., at which point the liquid is run out into crystallising frames. Tartaric acid separates out in large brownish crystals, and two further crops are obtained by further concentration of the mother liquor to 43° and 54° Bé. respectively. The tartaric acid is purified by recrystallisation from water with the aid of keiselguhr and decolorising carbon, whilst small quantities of calcium ferrocyanide and barium sulphide are added to remove traces of iron, copper and lead which have accumulated in the crude acid.

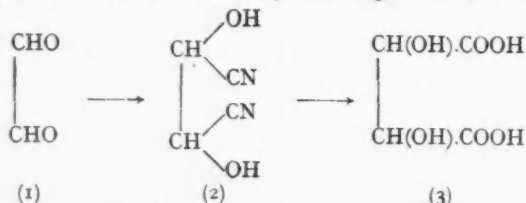
#### From Tamarinds

An appreciable quantity of tamarinds are converted into tartaric acid in India, and the method of extraction does not differ very markedly from that just described. The tamarind pulp contains 12-14 per cent. of tartaric acid, just over half of which is recoverable as the pure substance. The pulp is heated to 160° C. in an autoclave for an hour, after which the clear juice can be filtered easily at the press. The chemical treatment of the cleared juice follows the lines indicated above.

So far, although the process has been demonstrated to be quite feasible, the utilisation of sarmenta does not appear to have been developed on anything like the scale expected. The sarmenta is ground to a fine pulp and submitted to the process of ensilage. The temperature rapidly rises to 50-60° C., and after six weeks returns to normal, and the fodder is found to contain 1.5 per cent. of tartaric acid and about 2 per cent. of ethyl alcohol. It appears that the handling of such a bulk of product is not commercially profitable, as long as the price of tartaric acid remains round 1s. 3d. per lb.

#### Synthetic Production of Tartaric Acid

There are, of course, several synthetic processes, by which tartaric acid has been obtained on an "academic" scale for the purpose of establishing its constitution, but very few of these are adaptable to the large scale production of this acid, partly on account of the small yields at various stages, and partly on account of the difficulty of preparing the starting materials. Thus, in the synthesis from glyoxal(1), this compound is treated with sodium cyanide to give the dinitrile of



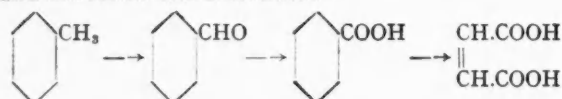
tartaric acid(2), which can easily be converted into tartaric acid itself(3) by hydrolysis. Such a process is industrially almost impossible on account of the difficulty of obtaining glyoxal. It is, however, not beyond the realms of chemical possibility that glyoxal will be produced by a high pressure synthesis (in the presence of catalysts) from very simple substances such as carbon monoxide and water; in which case synthetic tartaric acid from this source would probably displace the natural product.

It is, however, the racemic acid which is produced by the synthetic process, whereas the natural acid is the dextrorotatory variety; this fact does not appear to affect the commercial value of the acid, save, possibly, for the purposes of "sharpening" jam, in order to hide fruit deficiency; here, the inactivity of the added acid would indicate its non-natural origin. It has been proposed to manufacture tartaric acid from starch, but here again the technical difficulties cannot be overcome at a price which enables the product to compete with the natural variety. The process involves the heating of starch with dilute nitric acid in the presence of a catalyst such as vanadic or molybdic acid; a mixture of tartaric acid and saccharic acid is obtained and may be separated by the use of calcium chloride solution; the patents covering this process do not, however, indicate how the saccharic acid is to be disposed of.

Of the large scale processes which offer reasonable prospects of turning out tartaric acid at a competitive price, two are of considerable interest, namely, the conversion of aromatic hydrocarbons to maleic acid by regulated catalytic oxidation, followed by conversion of maleic acid to tartaric acid, and also the process of Baekeland and Peter, which involves the complete synthesis of the acid from carbon dioxide through the intermediate stages of formate and oxalate.

#### The Catalytic Process

In the first, or catalytic, process benzene or toluene may be used as the starting material (A.P. 1,377,534), the vapour being passed, together with air, over a catalyst mass prepared from vanadium pentoxide distributed over a suitable material such as pumice. The products obtained depend entirely on the temperature and the nature of the hydrocarbon. With benzene the sole product which can be readily isolated at 450-500° C. is maleic acid, but with toluene the process proceeds more efficiently and a mixture of benzaldehyde, benzoic acid and maleic acid is obtained:—



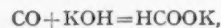
These three substances can be readily separated, the benzaldehyde by distillation in steam, the benzoic and maleic acids by the relatively insoluble nature of the former. Again, the conversion of the maleic acid to tartaric acid is a comparatively simple operation. The maleic acid(4) is dissolved in water and



a solution of sodium permanganate run in at such a rate that the temperature does not rise above 50-60° C. The oxidation takes the usual course, namely, the addition of the elements of hydrogen peroxide to the double bond of the maleic acid, and the product is racemic tartaric acid. After the oxidation, the solution may be filtered from the manganese mud produced and evaporated and crystallised in the usual way.

#### Baekeland and Peter's Process

The Baekeland and Peter process involves the use of much electrolytic plant, and depends for its success upon the economic production of potassium amalgam and chlorine by the electrolysis of a potassium chloride solution. The various stages are illustrated in the flow sheet below (Fig. 1). Chlorine (from the electrolytic plant) is passed together with steam over heated coke, when a mixture of hydrogen chloride, carbon monoxide and dioxide is produced. The hydrogen chloride is scrubbed out with water and used in the later stages of the production. By treating the mixture of carbon monoxide and carbon dioxide with dilute acid and potassium amalgam under slight pressure, the originators of this process claim to obtain a good yield of potassium formate according to the equation:—

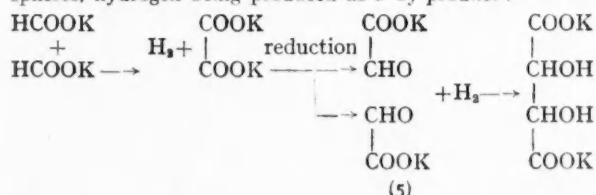


for which purpose the producer is adjusted so as to give the maximum yield of carbon monoxide.

The potassium formate obtained in the above stage of the operations is transformed into potassium oxalate by heating



to a temperature of 440° C. under a pressure of several atmospheres, hydrogen being produced as a by-product:—



The next stage consists in the reduction of the potassium oxalate to potassium glyoxalate by potassium amalgam in slightly acid solution. The potassium amalgam produced by the electrolytic plant is forced through a solution of potassium oxalate, to which hydrochloric acid is being added at such a rate that the solution remains just acid. The exhausted amalgam returns to the cells, and thus performs

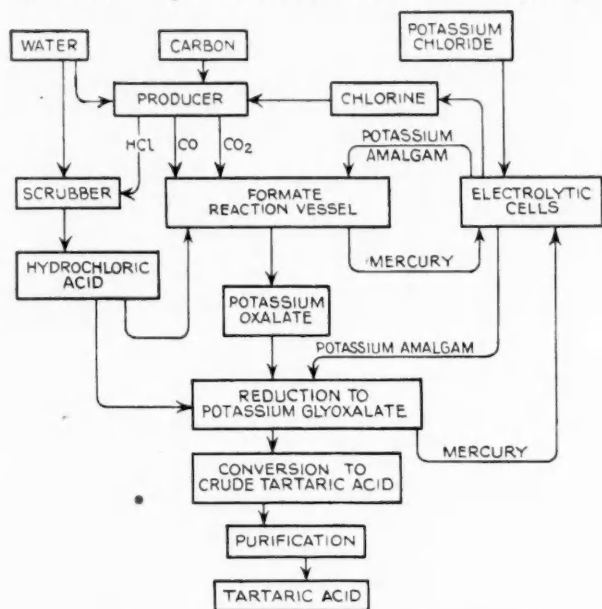


FIG. 1. FLOW SHEET OF TARTARIC ACID SYNTHESIS BY THE METHOD OF BAEKELAND AND PETER.

a cycle. The completion of the process, namely, the reduction of potassium glyoxalate (5) to potassium tartrate, is accomplished by cathodic reduction, the solution of the glyoxalate being circulated through the cathode compartment of a cell in which the anode electrolyte is a solution of potassium chloride; the potassium oxalate may then be worked up in the usual way. It is, perhaps, significant that for the latter stages of these processes the original inventors do not state any yields; nevertheless, the process is feasible and possesses potentialities which modern research into electrolytic methods should ultimately bring to fruition.

#### The Properties of Tartaric Acid

The simple properties of tartaric acid are too well known to need recapitulation here, more especially the optical properties, which, in the hands of Pasteur, constituted the foundations of stereochemistry. The solubility of tartaric acid is illustrated in the curve below (Fig. 2). It may, perhaps, be of interest to mention here a simple and rapid test which enables tartaric acid to be distinguished from citric acid, a matter of some convenience when kegs of both are apt to get mixed. If a little of the acid be heated on a nickel spatula, tartaric acid will be seen to burn with a blue flame, and to form, during combustion, a ball-shaped mass. Citric acid, on the other hand, melts, spreads over the surface of the spatula, and burns with a yellow flame.

The price of tartaric acid, and tartrates generally, follows in some measure the fortunes of the wine harvest, the amounts offered in any one year being dependent on the amount of

argol available. This is reflected in the figures below, which give the tonnage of tartaric acid exported from France:—

POTASSIUM TARTRATES—	1920. Tons.	1921. Tons.	1922. Tons.
Total .....	8,441	4,641	7,023
United Kingdom .....	2,414	640	1,197
U.S.A. ....	1,673	1,655	3,168
Germany .....			278
Italy .....			482
Netherlands .....	1,354	2,346	621
Others .....			1,277
TARTARIC ACID .....	633	343	422

These figures indicate that only a small proportion of tartaric acid is used as such (about 8 per cent.), and that the bulk of tartaric acid finds its way into commerce as the acid potassium salt (cream of tartar) and as Rochelle salt. Tartaric acid is used as a flavouring material in the production of the so-called "fruit drinks," but it is inferior to citric acid for this purpose. Its main use is in pharmacy for the production of effervescent salines, and in the preparation of dye baths.

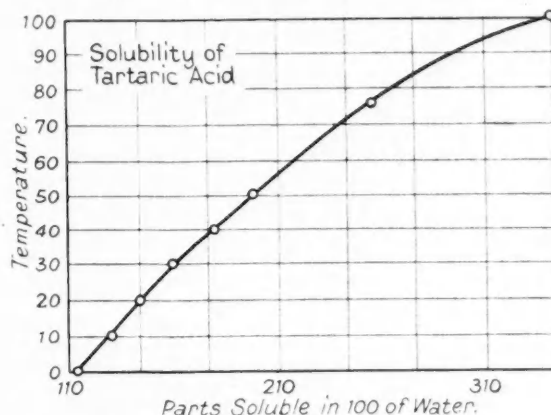


FIG. 2. SOLUBILITY OF TARTARIC ACID.

#### Derivatives of Tartaric Acid

The most important derivatives of tartaric acid are undoubtedly the sodium and potassium salts, although one or two of the other tartrates find a limited use industrially. Of these latter we may mention potassium antimonyl tartrate ("tartar emetic") used medicinally.

Acid potassium tartrate ("cream of tartar") finds wide application in baking as a "raising" powder constituent, as an "improver" of flour, and in the preparation of medicinal products. It is a white microcrystalline powder which is only sparingly soluble in water (0.4 part in 100 at 10° C.; 5.8 parts at 100° C.), a fact which makes it of extreme value in the preparation of baking powders, since its action takes place slowly and evenly throughout the course of the baking. Cream of tartar is best prepared straightway from argol. To this end the argol (1 ton) is boiled with water (600 gallons) in a large pitch-pine vat heated by direct steam, and milk of lime is run in until the whole is just faintly alkaline to litmus. At this point the reaction (1) below will have been completed and the tartaric acid will be present half as potassium tartrate and half as calcium tartrate. At this stage half an equivalent (calculated on an assay of the original argol) of sodium carbonate is added, when reaction (2) below

- (1)  $2\text{KHC}_4\text{H}_4\text{O}_6 + \text{Ca}(\text{OH})_2 = \text{K}_2\text{C}_4\text{H}_4\text{O}_6 + \text{CaC}_4\text{H}_4\text{O}_6 + 2\text{H}_2\text{O}$
- (2)  $\text{K}_2\text{C}_4\text{H}_4\text{O}_6 + \text{CaC}_4\text{H}_4\text{O}_6 + \text{Na}_2\text{CO}_3 = \text{CaCO}_3 + 2\text{KNaC}_4\text{H}_4\text{O}_6$
- (3)  $2\text{KNaC}_4\text{H}_4\text{O}_6 + 2\text{SO}_2 + 2\text{H}_2\text{O} = 2\text{KHC}_4\text{H}_4\text{O}_6 + 2\text{NaHSO}_3$

takes place, and all the tartaric acid is obtained in solution in the form of Rochelle salt. The solution is filtered from the calcium carbonate and treated with potassium ferrocyanide to remove iron, boiled with decolorising carbon to clear up traces of organic colouring matter, and finally filtered through infusorial earth. The clear solution may now be concentrated for the production of Rochelle salt, but if, as is more usual, cream of tartar is required, the solution is saturated with sulphur dioxide. Reaction (3) above takes place, and the precipitated crystals of cream of tartar are filtered off and washed.

## Corrosion in Steam Boilers

### Causes and Methods of Prevention

At the annual meeting of the Nottingham Section of the Society of Chemical Industry, Mr. Leonard O. Newton read a paper on "Corrosion, particularly in steam boiler installations." In connection with a steam raising installation, he said, there was probably nothing that caused the engineer more trouble than corrosion, and in nearly every case the condition of the feed was the cause of the trouble. The higher pressures and larger units now employed in modern boiler practice made the correct treatment of boiler feed water doubly important. Generally it was the presence of an acid body which caused the corrosion in the boiler plant. Boiler feed water consisted either of natural water or condensed steam, and in both cases it was usually necessary to treat the water before it was used as a boiler feed.

### Some Causes of Corrosion

Natural waters were divided into two classes, soft and hard. Corrosion by a natural soft water was due to acid present in the water, and it must be rendered alkaline before being fed to the boiler. Corrosion by a hard water was due to the dissolved chlorides and nitrates of calcium and magnesium. The exact reactions that took place at the temperature and pressure in the boiler were not definitely known, but it was generally accepted that magnesium chloride was particularly destructive, splitting up into magnesium oxide and hydrochloric acid, which attacked the steel, giving ferrous chloride. This, combined with the magnesium oxide, reformed magnesium chloride and ferrous oxide. This cyclic regenerative condition might go on indefinitely and cause considerable corrosion. Magnesium sulphate and sodium chloride were frequently present in natural waters, and under boiler conditions these might react to give magnesium chloride.

Another source of supply was condensed steam. The acidity of condensed steam was due to the presence of dissolved carbon dioxide and was frequently a cause of trouble to the engineer. According to J. H. Paul, under boiler conditions carbon dioxide was changed into formic acid, and possibly certain other acids which were most destructive to iron and steel. Economiser corrosion was usually due to the gases dissolved in the feed water, and showed itself by the formation of a red deposit and by the formation of rust cones. Pitting occurred and actual perforation might result.

Another cyclic reaction which might go on indefinitely was caused in the superheater by carbon dioxide. This was reduced to monoxide by hydrogen formed from the decomposition of steam by iron at a high temperature, and the carbon monoxide reduced some of the iron oxide on the tubes, reforming carbon dioxide.

A further form of corrosion, known as "caustic embrittlement," consisted of an intercrystalline cracking of boiler steel, which must be distinguished from the transcrystalline cracks caused by stress. It had not yet been definitely settled whether this intercrystalline cracking was due to chemical or to mechanical action.

Another aspect of corrosion was the external action on the boiler tubes, due to impurities in the fuel, the chief being soda and sulphur. The product of these in the furnace gases was sodium sulphate and, when the sulphur was in excess, sodium acid sulphate. Where the deposit of sodium sulphate accumulated, it caused overheating of the tube, and gave up oxygen to the iron, forming a "scab," which, owing to the expansion and contraction of the tube, peeled off, exposing a fresh surface. Continuation of this process resulted in bulging of the tube. The acid sulphate had little action while hot, but it attracted moisture when cold, and corrosion took place.

### Methods of Prevention

In order to prevent corrosion, it was necessary that the feed water should be made as soft as possible and, in addition, should have a very slight excess of alkalinity. In the case of a natural hard water, a good method was by a properly controlled lime-soda process, and the base exchange or zeolite method was also employed. The latter resulted in an exchange of lime and magnesia salts in the hard water for the soda in the zeolite; a very soft water was produced; but with very hard waters the rapid concentration of sodium salts in the boiler necessitated the frequent use of the blow-off cock.

The ideal way of producing an almost perfect boiler feed was by a combination of the two methods, that is, a preliminary treatment with lime or lime-soda, followed by zeolite. In this way only a small quantity of sodium carbonate would be left in the water. The lime and lime-soda methods were suitable when a large quantity of condensate was mixed with natural hard water, and were valuable also for condensates containing dissolved gases, the latter being seldom removed completely by a de-aerating plant.

In order that the water might be properly treated, a complete mineral analysis was necessary; estimation of hardness alone was not sufficient. It was also necessary to make regular and frequent tests of the feed water and the alkalinity, etc. of the water in the boiler. A good idea of the concentration of the water in the boiler might be obtained by estimation of the chlorides, this and the chloride in the feed giving a concentration factor. By means of a continuous blow-off system, the concentration in the boiler might be kept at a fairly constant figure.

## The Bussey Coal Distillation Process

### Glasgow Plant described by Dr. Cronshaw

A DESCRIPTION of the largest low temperature coal distillation plant in the world, now being erected at Glenboig, Glasgow, for the Bussey Coal Distillation Co., has been given by Dr. H. B. Cronshaw, chief technical adviser to the company. The plant, he states, is not an experiment. It is the outcome of several years' experiment and three years' successful working of two full-sized commercial units at Louisville, Kentucky, U.S.A. It will have a throughput of 500 to 600 tons of coal per day and a daily output of approximately 300 to 400 tons of smokeless fuel (semi-coke), 15,000 gallons of crude oil, and 15,000,000 cubic feet of gas.

The Bussey retort consists of a vertical, brick-lined steel shaft that is internally heated. Its general form is that of a truncated cone of oval cross section, the full section of which is occupied by a grate. The grate is hollow and divided into sections, through which air, gas and steam in controlled amounts are injected into the base of the charge. Immediately above the grate is the discharge mechanism, which consists of a hollow water-covered cast steel cutter bar, which, moving backwards and forwards across the grate, pushes off the coke from either end, in a form convenient for immediate use in the domestic grate. The products of the distillation are removed from the top of the retorts by an exhaustor.

The charge within the retort chamber may be considered as divided into three zones that merge into each other. In the top zone the incoming coal is heated to about 150° C. (300° F.) by the gaseous products from below, and some condensation of the oils takes place. The condensate is carried down by the charge, partly revaporised, and again swept upwards to the gas outlet. Meanwhile the heavier fractions are carried by the charge into the second zone, where the temperature range is between 150° C. and 425° C. (300° F. and 800° F.), and which may be looked upon as the distillation zone proper. Thirdly, the bottom zone is where the hardening or setting of the carbon residues takes place, and where the reduction of its volatile content is brought to the desired point. This is also the zone of combustion, in which gas and air are burned to supply the heat necessary.

One of the most interesting features of the Bussey process is that tests with a full-sized retort show that good coke can be made from most cannel and other coals usually classed as non-coking; in fact, by modifying the conditions of operation all sizes and grades, from slacks and duffs to run-of-mine, can be successfully treated.

The yield of crude oil varies from 20 gallons to 40 gallons per ton of bituminous coal charges, and a yield of approximately 30 gallons may be expected from any fair grade of high volatile bituminous coal. It was found that cannel coal gave yields of 50 to 100 gallons per ton of coal charged.

An average coal may be expected to yield between 20,000 and 30,000 cubic feet of gas per ton, and its calorific value is about 250 British thermal units per cubic foot. Bussey gas is adapted for industrial heating, and it may readily be converted through the medium of modern gas engines into cheap power. The Glenboig plant will consist of a battery of 14 retorts, each with a throughput of 50 tons a day.

### A Successful I.C.I. Essayist

IN the photograph reproduced below Sir Charles Higham (left) is seen presenting the Crawford Cup and cheque for £10 to Mr. L. E. Cornford, of Imperial Chemical Industries staff, at



Photopress Photo.

the last meeting of the London Publicity Club at the Hotel Cecil. The award was made for an essay on "The most needed reform in advertising." Mr. Cornford chose for his subject "The abolition of commission agents."

### Lautaro Nitrate Co. Meeting

AN extraordinary general meeting of the Lautaro Nitrate Co., Ltd., was held on Thursday, March 28, at Winchester House, London. The object of the meeting was the consideration of resolutions increasing the capital of the company by £1,440,000 to £8,000,000, consequent upon its acquisition of a large new area of nitrate-producing ground in Chile. In moving the resolutions, the chairman of the company, Mr. J. O. Herrera, who presided, said that the grounds they had purchased were of special interest, as they could be exploited at a cost considerably below the current level. It was a very important thing, he added, that the company should not only be in possession of the largest reserves of nitrate-bearing territory, but also that grounds recognised to be of the highest quality should not pass into the control of some other producer of Chilean nitrate, and so intensify the existing trading competition.

The resolutions were unanimously adopted.

### British Enka Report for 1928

THE report of the British Enka Artificial Silk Co. for the year 1928 states that No. 1 factory worked at full capacity throughout the year. No. 2 factory was working at the beginning of the year at about half capacity. Production was gradually increased in the first half of the year until by the end of June it was working at about 85 per cent. of capacity. Owing to certain technical difficulties, and also partly owing to general market conditions, it was deemed advisable thereafter to curtail production to 65 per cent. of capacity. Since the end of the year the scale of production has been increased in No. 2 factory, and the quality of the rayon produced has shown improvement.

### Coal for Gas Producers

#### Paper Before Society of Glass Technology

THE 115th meeting of the Society of Glass Technology was held at the University, Leeds, on Wednesday, March 20, 1929, the president, Mr. Walter Butterworth, senr., M.A., in the chair.

A paper on "The Selection of Coal for Gas Producers" was read by E. J. C. Bowmaker and J. O. Cauwood. Mr. Bowmaker, who presented this paper, stated that laboratory tests were carried out on some two dozen coal samples and the results obtained were compared with the performances of the coals in actual use in the producers. In each case the usual proximate analysis was done, including moisture, volatile matter, ash, and fixed carbon. The methods used in these determinations were described. From considerations of the volatile matter values, the coals could be classified as cannel, anthracite, bituminous; the ash values determined the economic value of the coal; and the fixed carbon indicated whether or not the coal was likely to form a deep fire bed. The sample of coal yielding the most satisfactory results in the producer was found to contain 36 per cent. volatile, with an ash content of 3 per cent. The standard specification finally chosen was not more than 5 per cent. ash; volatile matter between 35 and 38 per cent.

#### Caking, Solubility in Aniline and Softening Point

Many coals fell in this class, yet were unsatisfactory owing to "caking." After much experimental work it was found that the determination of the amount of a coal dissolved out by treatment with boiling aniline in a Soxhlet extractor yielded results which were in agreement with the "caking" tendencies, determined in another set of experiments, and also from the producer action. Coals which were definitely classed as non-caking yielded aniline-soluble values below 6 per cent.; while solubilities in aniline of over 10 per cent. were definitely associated with caking coals. One exception only was encountered. A cannel coal yielded a solubility in aniline of 12 per cent.

Further investigations on the softening points and the ferric oxide contents of the ash yielded proof that in all cases but one the fusing points were proportional to the iron oxide contents. The exceptional case was an ash containing 70 per cent. ferric oxide.

The following specification was given for a good producer coal: Ash not to exceed 5 per cent., volatile matter 35-38 per cent.; solubility in aniline not to exceed 7 per cent. under the conditions stated; the iron oxide content of the ash not to exceed 15 per cent. The last figure was liable to variation according to the method of working the producer.

Mr. F. S. S. Bryson read a paper on "Investigations into the Erosion of Tank Blocks."

### Increase of U.S.A. By-product Coke Production

BY-PRODUCT coke production established a new high record of 48,205,577 net tons last year, an increase of 9.8 per cent. over 1927, according to a report just issued by the United States Bureau of Mines, giving preliminary statistics of coke production in 1928. Beehive coke production, on the other hand, dropped to 4,376,000 tons, a decrease of 39.3 per cent. from 1927. The coal consumed in the manufacture of coke in 1928 amounted to 69,260,000 net tons charged in by-product ovens and 6,901,000 tons in beehive ovens. These and other preliminary coke statistics are contained in the Monthly Coke Report No. 11, which may be obtained upon request from the United States Bureau of Mines, Washington D. C.

### A Meter for Measuring Coal

THE Lea coal meter, for attachment to chain-grate stokers, is described in a booklet published by the makers, the Lea Recorder Co., Ltd., of 28, Deansgate, Manchester. The machine makes use of the movements of the grate and the fire door automatically to determine and count up the product of cross sectional area and velocity at all times, and under all variations of these two elements. This product represents the total volume, or cubic feet, of coal consumed and, knowing the volume, it is a very easy matter to determine the weight, which is, of course, the ultimate object aimed at. The accuracy guarantee is 2½ per cent., by volume, under ordinary boiler house conditions.



## Sterilisation of Swimming Bath Water

### Chemical and Bacteriological Analysis

WITH regard to the fact that by sterilisation with a measured trace of chlorine gas, combined with other treatment, it is now possible to operate swimming baths for many months with the same water, some interesting chemical and bacteriological test figures have been made available. These relate to the Hoxton Baths, Shoreditch (London), and represent the water after a summer season's running, equal to use by about 100,000 bathers.

The installation comprises a first-class bath with a capacity of 140,000 gallons, and a second-class of 79,000 gallons. The contents of both baths are circulated respectively through the purification plant at the rate of 23,400 and 13,200 gallons per hour. All the equipment has been supplied by the Paterson Engineering Co., Ltd. After the season's running the ammoniacal nitrogen in the first-class bath is 0.0026 parts per 100,000, and in the second-class bath 0.0040, while the corresponding figures for albuminoid nitrogen are 0.0094 and 0.0140. The "nitrous" nitrogen is nil, indicating the absence of organic material, and the "nitric" nitrogen is 0.730 parts per 100,000 in both cases. There is no trace of free chlorine, the chlorides are only 5.10 and 5.30 per 100,000 respectively, while the total  $\text{CO}_2$  is 37.0 and 36.0, of which 1.20 and 1.80 are "free"  $\text{CO}_2$ . The water is perfectly clear, equal in colour to average good quality drinking water, neutral in reaction, and without smell, while the total hardness is 24.5°, London town water supply being, of course, very high in this respect. As regards the bacteriological analysis in both baths, *Bacillus Coli Communis* and *Bacillus Enteritidis* Sporogenes are entirely absent in 100 cc. The total number of colonies per cc. capable of growing upon nutrient gelatine at 20° C. in 3 days is 6 in the case of the first-class bath and 10 for the second-class bath, whilst in each case 2 colonies only were grown upon agar jelly at 37° C. in one day.

### The Supply of Radium

It is believed that the Government intend, following the reception of a report from a sub-committee of the Civil Research Committee, to take action to control the purchase and distribution of radium. The committee is said to have reported that an adequate supply of radium is an urgent necessity for every country, and that the use to which it has been put in skilful hands has been one of the most notable features of medical progress. The evidence established the fact that there is not at present a sufficient supply available for the needs of this country. The radium now used has to be purchased in a haphazard and uneconomical way. In the opinion of the committee it is necessary that steps should be taken to overcome that difficulty. Directly the House of Commons re-assembles the Government will be further questioned on the subject, and it is probable that they will announce their readiness to legislate at once—a bill has already been prepared by the Ministry of Health—if there is general agreement that the proposals should be treated as uncontroversial.

### Conference on Fire Protection

FOLLOWING the recent conference arranged by the Association of Liquid Chemical Fire Extinguisher Manufacturers, and in response to the many requests received by the Association, a further conference will be held on Tuesday, April 9, at the Institution of Mechanical Engineers, London, S.W.1. The chair will be taken by Mr. A. E. Wiseman, chairman of the Council of the Association, and the speakers will be Mr. F. B. Willis, chief officer of the fire brigade of Kodak, Ltd., late senior superintendent London Fire Brigade, and Mr. A. W. Cook. The general subject of the conference will be the need of some simple form of organisation and staff training for private fire protection. The importance of this subject requires particular emphasis amongst those who have only a small amount of fire equipment, as such users are liable to overlook the need for some definite plan of action in case of an emergency. Cards of invitation will gladly be sent, on receipt of request, by the Secretary, A.L.C.F.E.M., 6, Martin Lane, Cannon Street, London, E.C.4.

## General Meeting of Hadfields

SIR ROBERT HADFIELD, in moving the adoption of the report and balance-sheet at the annual meeting of Hadfields, Ltd., on Wednesday, March 27, at Sheffield, said, with reference to the heavy falling off in trade, chiefly during the last eight months of the past year, that he had had a long business experience, but must say that during the last few years he never remembered such extraordinary fluctuations as had occurred. There had at times been most excellent spurts, but, unfortunately, these had lasted only for a short time, followed by long depressions. This was specially the case last year. It was most difficult to carry on, satisfactorily, modern and highly organised plants, possessing large capacities, under such conditions. Overhead standing charges, such as staff and other expenditures, could not be cut down, otherwise sudden and increased demands could not be met. With plants of high efficiency and capable of running to their full 100 per cent. output, how was it possible to meet fluctuations of some 30 per cent. production with the full overheads going on all the time? Their own plants were on a very large scale, but general demand on the average had been comparatively low.

Mr. P. B. Brown, managing director, in seconding, said they had had to contend with unprecedented price-cutting in their engineering products, but matters were improving. The revival in the coal trade was already being reflected in the departments which produced mining requisites. They had orders to-day on their books for colliery requisites as great as during the whole of last year, and if that trend of affairs continued the results of the year's operations would be very much better than those of the year under review.

### New Cement Development

THE demand for high-class Portland cement is becoming more and more insistent, and users will be interested in the modern cement works now rapidly nearing completion at Ketton, Rutland. Thos. W. Ward, Ltd., of Sheffield, whose activities in the iron, steel and constructional trades are well-known, have a controlling interest in the Ketton Portland Cement Co., Ltd., which has acquired an estate in Rutland of 1,174 acres, including the Ketton Oolitic Freestone Quarries, and by July the works will be manufacturing high grade Portland cement at the rate of 60,000 tons per year.

From the Ketton Quarries stone has been taken for centuries and used in such buildings as the Tower of London, St. Dunstan's, Lambeth Palace, and many of the ancient buildings at Cambridge and in the more modern Peterborough and Ely Cathedrals. The stonework at Sandringham House also came from these quarries. The Ketton oolitic limestone and clays have proved ideal raw materials for cement when mixed in the right proportion and the supplies are almost inexhaustible and can be easily worked. A well-known firm of consulting engineers and experts in cement machinery are responsible for the erection of the plant and it is anticipated that the production stage will be reached by June, and that supplies of cement will be available in July.

The new cement, which is to be marketed as "Ketco" brand, will fully comply with the British Standard Specification. The new company has a share capital of £300,000 divided into 200,000 ordinary shares of £1 each and 100,000 7½ participating preference shares of £1 each, and 90,000 of the latter will shortly be offered for subscription at par. The ordinary shares have all been privately subscribed.

### Russian Potash Developments

AN article appearing in a government publication of the Soviet Union states that the construction of new potash mines on the Upper Kama River is well under way. Two mines, No. 1 being developed by Soviet engineers, and No. 2 by German potash specialists, are expected to be ready for exploration next spring. Effective exploitation of the Kama potash deposits involves several transport problems. Two-thirds of the potash mined will, it is thought, be shipped down the Kama River, but this will be possible only after considerable dredging. Since an efficient fertiliser can be obtained only by mixing Kama potash with phosphates, it is very desirable to build a railroad connection between the Solikamsk potash deposits and the Kaigorod phosphate area. The railway connecting Ussolie and Solikamsk, which is now under construction, will by no means solve the problem.

## From Week to Week

SIR FELIX BRUNNER has been elected chairman of Madeley Collieries, Ltd.

AN INCREASE IN CAPITAL from £3,000,000 to £6,000,000 will be proposed at the annual meeting of the United Molasses Co., on April 15.

SIR MAX MUSPRATT is confined to his bed with an attack of internal inflammation. As we go to press, we learn that his condition is unchanged.

J. M. NEWTON VITREO-COLLOID (1928) announce that they have secured a site for the new factory at Oxted, and building operations are about to proceed.

THE BRITISH ASSOCIATION has decided not to accept the invitation of the York Corporation to hold its centenary meeting in 1931 at York. The proposal was made in view of the fact that the Association was founded at York in 1831.

DR. BOSCH'S visit to the United States (to which reference was made in these columns last week) is said in the German press to have as one of its objects the introduction of the shares of the I. G. Chemie, of Basle, on the New York stock exchange.

AS THE RESULT of an accident at the factory of Synthetic Ammonia and Nitrates, Ltd., Billingham, on March 27, Alfred Noah, of 35, Ruscoe Road, Billingham, was admitted to the Stockton and Thornaby Hospital, suffering from a fractured leg and severe burns.

A NEW COMPANY has been formed at Waldenburg, in Silesia, with a capital of £400,000, for the production of synthetic nitrogen products. The erection of the plant has commenced, and it is stated that the output capacity will be 15,000 tons, to be doubled later.

MR. E. D. METCALFE has been elected a director of Murex, Ltd., as nominee of Imperial Chemical Industries, Ltd. In addition to being a director of Imperial Chemical Industries, Mr. Metcalfe is on the boards of Lighting Trades, Ltd., and Clay Ring Co., Ltd. He is a delegate director of Curtis and Harvey, Ltd.

AT THE ANNUAL MEETING of the Nottingham Section of the Society of Chemical Industry last week Dr. F. L. Pyman was re-elected chairman, Dr. J. B. Firth and Dr. E. B. R. Prideaux vice-chairmen, Mr. D. J. Law treasurer, and Mr. W. T. T. Ainsworth secretary. Mr. Leonard O. Newton (London) afterwards read a paper on "Corrosion," particularly in relation to steam boiler installations.

DURING LAST YEAR the total import of French carbide into this country amounted to 6,544 tons. The carbide factories controlled by the French Carbide Syndicate recently decided to adopt the proposed new international rules, and guarantee their carbide to yield the fixed minimum of 4.8 cubic feet per lb. Recently plans have been discussed in France for erecting large factories in the North of France in competition with the hydro-electric plants. H. H. Rieser and Co., London, are the sole selling agents for the carbide produced by the works of the French syndicate.

THE SOCIÉTÉ BELGE DE L'AZOTE intends to undertake the production of calcium cyanamide, with an annual output of 21,000 tons. Belgium is a great consumer of this substance, the amount used being 24½ kilos. per hectare of cultivated land, against 20 and 8 kilos. in Germany and France respectively. At present it is imported, mainly from Germany, with a smaller quantity from Norway. The high lime-content plays an important part in the treatment of the acid soil of Belgium. The growth of the Belgian use of calcium cyanamide is indicated by the fact that imports of 5,000 tons in 1919 grew to 35,000 tons in 1927-28.

IN THE SHOREDITCH COUNTY COURT, on Thursday, March 28, before Deputy Judge Thesiger, Frederick George Moore, of 97, Olinda Road, Stamford Hill, was the applicant in a Workmen's Compensation Act claim, the respondents being F. Williams and Son, of 48, Scrutton Street, Shoreditch, E., disinfecting fluid manufacturers. The applicant, in his claim, said that on June 27 of last year he was carrying two cans of carbolic, the disinfecting fluid which was manufactured by the respondents, when the handle of one of the cans broke, and fell on his left foot, bruising his toe. He was wholly incapacitated for a fortnight; his wages had been 30s. a week, and he claimed £1 a week for the two weeks. The judge entered an award in the applicant's favour for the amount claimed, and costs.

THE ELEVENTH ANNUAL DINNER of the Oil and Colour Chemists' Association will be held at the Connaught Rooms, Great Queen Street, Kingsway, London, on Tuesday, April 16 (reception, 7 p.m., dinner, 7.30). Invitations have been accepted by Dr. G. C. Clayton, M.P., Professor J. F. Thorpe (president of the Chemical Society, Mr. J. Arthur Reavell (president of the Institution of Chemical Engineers), Mr. G. Giles (president of the Incorporated Institute of British Decorators), Mr. G. Stubbs, Mr. C. A. Mackinley (president of the National Federation of Associated Paint, Colour and Varnish Manufacturers), Mr. S. K. Thornley (president of the Research Association of British Paint, Colour and Varnish Manufacturers), and Mr. T. Wilson (Deputy Keeper of Westminster Hall). Tickets may be obtained from the Secretary, 30, Russell Square, London, W.C.1, price 12s. 6d., exclusive of wine, but inclusive of gratuities.

LARGE DEPOSITS OF SULPHUR are stated to have been discovered at the Putarna Volcano, near Calama, Chile.

TURNER AND NEWALL, it is reported from Johannesburg, have acquired the Montana asbestos property in the Pietersburg area for about £100,000.

THE NORTH EAST COAST EXHIBITION of Industry, Science and Art, to be held at Newcastle, May-October, will be opened by the Prince of Wales on May 14.

THE ACTON WORKS of the Newtex Safety Glass Co. are in full production, and negotiations are practically completed for the acquisition of a site in London for the erection of larger works.

THE LATE MR. ALFRED WILLIAM MOND, formerly chemist with Imperial Chemical Industries, Ltd., left estate in his own disposition of the gross value of £28,028, with net personalty £17,208. He left all his property to his wife, and nominated her sole executrix.

MR. G. J. GREENFIELD, who is retiring from his position as manager of the Consett Fell Coke and By-Products Works to take up a similar post at Thorncliffe, near Sheffield, was presented with a writing desk on March 30, by officials and workmen of the company.

THE REPORT of the Commission of Inquiry into the Holborn street explosions will be published in a few days in the form of a White Paper. The report expresses an opinion on the actual causes of the explosions, and makes suggestions for reducing the risk of their repetition.

THE SHAREHOLDERS of the African and Eastern Trade Corporation, at a meeting in Liverpool, on March 28, approved a resolution for amalgamation with the Niger Co. and the fusion of the whole trading assets of the two organisations under the new company to be called the United Africa Co., Ltd.

THE REPRESENTATIVE of a Dutch firm has, states the *Yorkshire Post*, visited Selby to make inquiries for a site on which to erect works for the manufacture of artificial silk. He viewed the former site of the Aircraft Works at Barlow, four miles from Selby, and seemed favourably impressed. Subsequently he interviewed officials of the London and North Eastern Railway Co., and was given all information as to railway facilities and provision of special conveniences for the site.

THE TRUSTEES of the Australian Science and Industry Endowment Fund have made grants in aid of research work to the following scientific workers in Australia (supplementary to grants made in November, 1928):—Mr. T. Iredale, for work on organic substances containing iodine; Dr. F. Lions, for work on optically active compounds of certain minerals; Dr. W. Davies, for investigations of the stereochemistry of salts of organic bases; and Dr. B. Cavanagh for work on potentiometric titration.

A SERIES OF TESTS, conducted at the Pittsburgh experiment station of the United States Bureau of Mines, indicate that the use of petrol containing lead tetraethyl does not materially affect the percentage of carbon monoxide contained in the exhaust gases. Further details are given in Serial 2008, "Carbon Monoxide from Automobiles Using Ethyl Gasoline," by W. P. Yant and L. B. Berger, copies of which may be obtained from the United States Bureau of Mines, Department of Commerce, Washington, D.C.

THE STANDING COMMITTEE appointed by the Board of Trade will begin their inquiry as to whether imported glassware (lamp blown ware and scientific glassware of all descriptions, including tubing and rod) should bear an indication of origin, at 11.30 a.m. on Monday, April 29. A further meeting will be held at 10.30 a.m. on Tuesday, April 30. The inquiry will be held at the Board of Trade Offices, Great George Street, London, S.W.1. Communications should be addressed to the Secretary, Mr. E. W. Reardon, at that address.

A MEETING of the North East Coast Coal Trimmers' and Teemers' Conciliation Board has been especially convened to deal with complaints which have arisen at local shipping ports with regard to the conditions under which cargoes of pitch are loaded, and the effect of this work on the health of the men. In the confined atmosphere of the vessels' holds pitch is stated to give off fumes which effect the respiratory organs, the eyes and the skin; and it is said that men, after completing a shift at this work, are sometimes in a state of collapse. Goggles are provided, but as a result of the hot atmosphere and the fumes they cannot be effectively used. The Conciliation Board is to meet shortly.

THE DEPARTMENT OF OVERSEAS TRADE announce that Mr. R. V. Laming, Commercial Secretary to the British Legation at The Hague, will shortly arrive in this country on an official visit. Mr. Laming will be in attendance at the offices of the Department during the week commencing Monday, April 8, when he will be prepared to interview representatives of firms interested in the export of British goods to the Netherlands. He will subsequently visit a number of commercial centres in the provinces. Applications for interviews with Mr. Laming in London should be made once to the Comptroller-General, Department of Overseas Trade at 35, Old Queen Street, London, S.W.1, quoting the reference, 7113/1/29.

### Obituary

MR. GEORGE S. SIDDLE, of Middleton St. George, Darlington, manager and chemist of the Dinsdale Smelting Co., on March 27.

## References to Current Literature

### British

- ANALYSIS.—Standard analysis of pure copper. (From the Munitions Supply Board of the Commonwealth Department of Defence.) *Chemical Engineering and Mining Review* (Australia), February, pp. 192-198.
- ARTIFICIAL SILK.—A qualitative test for degraded artificial silk. O. S. Rhodes. *J. Textile Inst.*, March, pp. 55-56T.
- EMULSIONS.—Emulsions, their scope and application. W. E. Billingham. *J. Soc. Dyers and Col.*, March, pp. 63-67.
- GLASS.—Some interesting physico-chemical phenomena exhibited by minor constituents in glass. W. E. S. Turner. *J.S.C.I.*, March 22, pp. 65-67T.
- OILS.—The composition of  $\alpha$ -elæostearic acid, the most important component of Chinese wood oil (tung oil). J. Böeseken. *J.S.C.I.*, March 22, pp. 71-72T.
- VITAMINS.—Vitamin D content of the liver oil of the dogfish. H. N. Brocklesby. *Canadian Chem. and Met.*, March, pp. 23-26. The vitamin D potency of several samples of dogfish liver oil has been determined. It was present in all the samples examined. The vitamin D potency varied in samples from different localities from less than 10 per cent. to about 30 per cent. of the potency of medicinal cod liver oil.
- WOOL.—Some scientific aspects of wool as they affect the wearer. S. G. Barker. *J. Soc. Dyers and Col.*, March, pp. 77-82.

### United States

- AMMONIA OXIDATION.—The gauze catalyst in ammonia oxidation. G. A. Perley and M. W. Varrell. *Ind. and Eng. Chem.*, March, pp. 222-223.
- APPARATUS.—Combined pneumatic trough, steam- and water-bath. C. R. Hoover. *J. Chemical Education*, March, pp. 519-520.
- An electric water still. G. B. Cooke. *J. Chemical Education*, March, pp. 521-522.
- CELLULOSE.—Cellulose from constalks. H. A. Webber. *Ind. and Eng. Chem.*, March, pp. 270-275. Constalks are more easily reduced to cellulose than are woods, but give a lower yield, and the pulp needs more bleaching. A factory for the manufacture of wall board from stalks will soon start operations in Dubuque, Iowa.
- Cellulose from cereal straws. S. D. Wells. *Ind. and Eng. Chem.*, March, pp. 275-278.
- Pulping flax straw. VI.—Properties of flax straw cellulose and its value in the cellulose industries. E. R. Schafer and M. W. Bray. *Ind. and Eng. Chem.*, March, pp. 278-280.
- CORROSION.—Soil survey cuts costs in preventing pipe line corrosion. W. T. Smith. *Chem. and Met. Eng.*, March, pp. 137-138.
- DYEING.—The dyeing of silk (organzine and tram) "fast to sun and rain." R. Curtis. *Amer. Dyestuffs Reporter*, March 18, pp. 171-172, 198-199. Weighting and dyeing; fastness required; a table of fastness properties; light and water fastness properties; significance of the tests.
- GENERAL.—Highly developed technique required to purify gases for "neon" signs. J. H. O'Neil. *Chem. and Met. Eng.*, March, pp. 143-144.
- What are the savings in handling muriatic acid in bulk? C. A. Rauh. *Chem. and Met. Eng.*, March, pp. 152-153.
- How does carbon dioxide behave under pressure? N. W. Krase and J. B. Goodman. *Chem. and Met. Eng.*, March, pp. 162-163. A preliminary study of the possible industrial applications of carbonic acid when used at moderate pressures, including the use of compressed carbon dioxide as an acid.
- Preparation and properties of the ammonium phosphates. W. H. Ross, A. R. Merz, and K. D. Jacob. *Ind. and Eng. Chem.*, March, pp. 286-289.

By-products of furnace-made phosphoric acid. K. D. Jacob and D. S. Reynolds. *Amer. Fertiliser*, March 16, pp. 19-23. Possible by-products mentioned are hydrogen; fused cement and slag; carbon monoxide; ferrophosphorus; fluorine derivatives; potash; active carbon.

LOW TEMPERATURE TAR.—Composition of tar from low-temperature carbonisation of Utah coal. II.—Heavy portions. R. L. Brown and R. N. Pollock. *Ind. and Eng. Chem.*, March, pp. 234-238.

ORGANIC.—Crystalline turanose. C. S. Hudson and E. Pacsu. *Science*, March 8, p. 278. The disaccharide turanose (obtained from melizitose) has been crystallised for the first time; m.p. 157°C.

PLANT.—Planning equipment and layout in a fine chemical plant. J. A. Lee. *Chem. and Met. Eng.*, March, pp. 132-136.

VITAMINS.—The vitamin A, B, and C content of artificially versus naturally ripened tomatoes. M. C. House, P.M. Nelson and E. S. Haber. *J. Biol. Chem.*, March, pp. 495-504.

### German

ANALYSIS.—The quantitative determination of sulphates in fluorides, especially in cryolites. H. Ginsberg with G. Holder. *Zeitschrift angewandte Chem.*, March 23, pp. 314-317.

The detection of small quantities of vanadium. A. Fölsner. *Chemiker-Zeitung*, March 30, p. 259.

APPARATUS.—A homogeniser for laboratory use. G. Frank. *Chemiker-Zeitung*, March 30, p. 259.

GENERAL.—The carbide trade and the technique of gas measurement. R. Vondráček. *Chemiker-Zeitung*, March 27, pp. 247-248.

Advances in the domain of electric cells and dry batteries. E. Liedel. *Zeitschrift angewandte Chem.*, March 23, pp. 301-307.

MATERIALS.—Tungsten as a chemo-technical material. H. Althertum. *Zeitschrift angewandte Chem.*, March 16, pp. 275-278; March 23, pp. 308-314.

ORGANIC.—The development of the catalytic oxidation of anthracene to anthraquinone. H. Brückner. *Chemiker-Zeitung*, March 30, p. 258.

### Miscellaneous

APPARATUS.—Analytical balance for high temperatures. T. Somiya. *J. Soc. Chem. Ind. Japan* (supplemental binding), March, pp. 75-76 B (in English). Describes a new and simple balance for weighing continuously and accurately to 0.1 mg. even when the body is heated to high temperatures and its weight changes with time.

CEMENT.—Some new moduli and indices relating to main hydraulic components of Portland cement. I and II. S. Nagai. *J. Soc. Chem. Ind. Japan* (supplemental binding), March, pp. 73B, 73-75B (in English).

GENERAL.—The use of the three electrode vacuum tube in potentiometric titration. M. Matsui and T. Shimomura. *J. Soc. Chem. Ind. Japan* (supplemental binding), March, pp. 65-67B (in English).

Determination of the transition point of sodium sulphate by the method of solubility. M. Matsui, S. Oguri, H. Noda, and N. Kumagai. *J. Soc. Chem. Ind. Japan* (supplemental binding), March, pp. 67-71B (in English).

OILS.—Thermochemical investigations of mineral oils. IV.—Thermochemical transformation of squalene. R. Abe and G. Schobayashi. *J. Soc. Chem. Ind. Japan* (supplemental binding), March, pp. 62-63B (in German).—V.—The thermochemical transformation of the liquid paraffins. R. Abe. *Ibid.*, pp. 63-64B (in German).

Studies on chlorinated fatty oils. I.—Chlorinated herring oil and its soap. M. Hirose and T. Shimomura. *J. Soc. Chem. Ind. Japan* (supplemental binding), March, pp. 71-73B (in English).



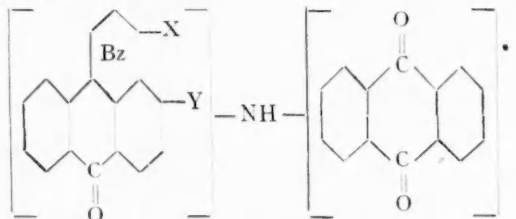
## Patent Literature

The following information is prepared from published Patent Specifications and from the Illustrated Official Journal (Patents) by permission of the Controller to H.M. Stationery Office. Printed copies of full Patent Specifications accepted may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, at 1s. each.

### Abstracts of Complete Specifications

- 306,874. VAT DYESTUFFS, PRODUCTION OF. J. Y. Johnson, London. From I.G. Farbenindustrie Akt.-Ges., Frankfurt-on-Main, Germany. Application dates, August 22, 1927, and February 1, 1928.

These dyes are obtained from condensation products of the general formula.



in which the anthraquinonyl radicle is attached by means of the NH group to the benzanthronyl radicle in a position other than those containing the substituents X and Y, and in which both X and Y are hydrogen atoms or X a 2- or a Bzl-benzanthronyl radicle or an etherified hydroxy group when Y is hydrogen, or Y is a 2- or a Bzl-benzanthronyl radicle when X is hydrogen, one further anthraquinonyl radicle being attached to the benzanthronyl radicle by means of a NH group. The products are treated with alkaline condensing agents to obtain the dyestuffs. The initial materials may be obtained by condensing an amino-anthraquinone with suitable halogenated benzanthrone. The initial material may be the condensation product from 1-amino-anthraquinone and halogenated Bzl-methoxy-benzanthrone obtainable by treating a halogenated Bzl-nitrobenzanthrone with methanol in the presence of alkaline agents as described in Specification No. 291,131 (See THE CHEMICAL AGE, Vol. XVIII, p. 614.) The condensation products from amino anthraquinone and halogenated 2-Bzl'-dibenzanthronyls may also be used. The treatment with alkaline condensing agents is carried out at 130°—200° C. with alcoholic caustic alkalis, or at 240° C. when using a melt of caustic alkalis. A large number of examples are given. Reference is directed in pursuance of Section 7, Sub-section 4, of the Patents and Designs Acts 1907 to 1928, to Specification No. 25,551/1908.

- 306,998. METALLIC NITRATES, MANUFACTURE OF. A. Carpmal, London. From I.G. Farbenindustrie Akt.-Ges., Frankfurt-on-Main, Germany. Application date, December 1, 1927.

Metallic nitrites are converted into nitrates in aqueous solution by treating with oxygen or gases containing it at a temperature above 150° C. and at an increased pressure, e.g., 15 atmospheres. The reaction is accelerated by the addition of a catalyst such as an alkali hydroxide. The nitrite, e.g., potassium nitrite, may be obtained by the action of nitrous gases on the oxide or carbonate.

- 307,130. ORTHO-NITRO-DIARYL ETHERS AND ORTHO-AMINO-DIARYL ETHERS. O. Y. Imray, London. From I.G. Farbenindustrie Akt.-Ges., Frankfurt-on-Main, Germany. Application date, December 15, 1927.

Ortho-nitro-diaryl ethers are obtained by acting with an alkali metal salt of a hydroxy compound of the aromatic series on an ortho-dinitro-compound of the benzene series, with or without a solvent or diluent. The product may be reduced in the usual manner, e.g., with iron and acetic acid, to the ortho-aminodiaryl ether. The products are intermediates for the production of dyestuffs, and examples are given.

- 307,137. ESTERS, MANUFACTURE OF. Imperial Chemical Industries, Ltd., Broadway Buildings, Westminster, London, S.W.1, W. Gibson and J. B. Payman, Crumpsall Vale Chemical Works, Blackley, Manchester. Application date, December 21, 1927.

Esters of aliphatic acids are obtained by heating an aliphatic acid amide and a monohydric or polyhydric aliphatic or alicy-

elic alcohol. The catalyst consists of a metallic inorganic salt such as zinc chloride or sulphate or mercuric chloride. The ester of the organic acid is formed, and ammonia is liberated and may be used for the manufacture of formamide by reaction with carbon monoxide. The process provides a method for the formylation of alcohols by carbon monoxide, and for the acetylation of alcohols by keten. The best results are obtained by using *n*-propyl alcohol *n*-, iso-, and tert-butyl alcohols, amyl alcohols, ethylene glycol and its mono-alkyl ethers, propylene glycol and its monoalkyl ethers, and cyclohexanols. The formic ester boils at a lower temperature than the alcohol from which it is made, so that by the use of a reflux condenser alcohol is returned to the reaction while ester vapour passes off, and the reverse reaction is prevented. Several examples are given.

- 307,188 and 307,190. IRON PYRITES, TREATMENT OF. S. I. Levy, 11, Englewood Road, Clapham Common, London, S.W., and G. W. Gray, 24, St. John's Wood Park, London, N.W.8. Application date, February 10, 1928.

307,188. Iron pyrites is heated in the absence of air to 700°—900° C. to obtain elemental sulphur, and a residue which is then treated with hydrochloric acid to obtain ferrous chloride solution, which is separated and heated in the presence of air with or without steam to obtain hydrochloric acid and ferric oxide. The hydrochloric acid is used for treating further quantities of the first residue. The sulphuretted hydrogen evolved is burned to obtain pure sulphur, and the residue obtained after the hydrochloric acid treatment is roasted in air, and the sulphur dioxide evolved may react with sulphuretted hydrogen obtained as above to form sulphur. The roasted residue is extracted with water and/or acid to dissolve out the copper and zinc salts, and the residue is roasted with ferrous chloride, and copper or zinc salts again extracted with water and/or acid. The copper and zinc solutions are electrolysed to extract the metals. The ferric oxide obtained may be heated with iron pyrites to obtain a product which is more easily attacked in the hydrochloric acid treatment. The hydrochloric acid solution obtained from the heated pyrites may be electrolysed to deposit lead, and ferrous chloride then crystallised out and heated in an oxidising atmosphere to obtain hydrochloric acid and ferric oxide. Full details of the process are given, together with flow sheets.

307,190. This process consists in decomposing the pyrites with chlorine at 250°—1000° C. to drive off sulphur and other volatile elements. The residue of non-volatile chlorides is dissolved in water to form a concentrated solution, from which the copper is precipitated with iron. The ferrous chloride solution is electrolysed at a low E.M.F. to remove lead, and then electrolysed for the recovery of iron and chlorine, the latter being used for treating further quantities of pyrites. Alternatively, the ferrous chloride may be crystallised and heated in air to obtain ferric oxide and hydrochloric acid. Details are also given of the recovery of any zinc present.

- 307,223. AROMATIC CARBOXYLIC ACIDS, PRODUCTION OF. J. Y. Johnson, London. From I.G. Farbenindustrie Akt.-Ges., Frankfurt-on-Main, Germany. Application date, March 21, 1928.

Aromatic hydrocarbons are treated with carbon dioxide at a pressure above 10 atmospheres and temperature of 50°—200° C. in the presence of anhydrous aluminium chloride, to obtain aromatic carboxylic acids. Examples are given of the treatment of benzene to obtain benzoic acid, chlorobenzene to obtain *p*-chlorobenzoic acid, toluene to obtain *p*-toluic acid, and xylene to obtain xylic acids.

- 307,230. FERTILIZERS. J. Y. Johnson. From I.G. Farbenindustrie Akt.-Ges., Frankfurt-on-Main, Germany. Application dates, March 30 and August 31, 1928.

Solid silicious substances are heated with phosphoric acid corresponding to 1½ to 8 times the weight of silica to a temperature above 250° C. Any excess of phosphoric acid may be removed by washing, and the product is a fertilizer which slowly decomposes into water-soluble phosphoric acid and silica in the soil. The fertilizer may also be mixed with other

fertilizers such as urea, calcium or ammonium phosphates, or ammonium sulphate.

NOTE.—Abstracts of the following specifications which are now accepted, appeared in THE CHEMICAL AGE when they became open to inspection under the International Convention—279,488 (J. M. F. D. Florentin, A. J. Kling, and C. Matignon) relating to obtaining light hydrocarbons, see Vol. XVII, p. 623; 280,529 (A. Boehringer) relating to tetrazoles, see Vol. XVIII, p. 57; 281,713 (Soc. of Chemical Industry in Basle) relating to dyestuffs, see Vol. XVIII, p. 127; 285,071 (Goodyear Tire and Rubber Co.) relating to halide addition products, polymers, and oxides of rubber, see Vol. XVIII, p. 348; 286,726 (International Fireproof Products Corporation) relating to chlorinating hydrocarbons, see Vol. XVIII, p. 463; 296,974 and 301,415 (Soc. Anon. des Distilleries des Deux Sèvres) relating to anhydrous acetic acid, see Vol. XIX, p. 466, and Vol. XX, p. 130; 300,114 (I.G. Farbenindustrie Akt.-Ges.) relating to indigoid vat dyestuffs, see Vol. XX, p. 31.

#### International Specifications not yet Accepted

305,026. PURIFYING GAS. W. J. Huff, 3424, University Place, Baltimore, U.S.A. (Assignee of O. W. Lusby, 824, Beaumont Avenue, Govans, Baltimore, U.S.A.) International Convention date, January 28, 1928.

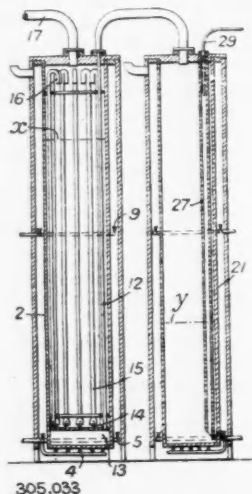
Sulphuretted hydrogen and organic sulphur compounds are removed from combustible gases by passing over copper, silver, iron, nickel, cobalt, lead, tin, or antimony, or their oxides, with metals or oxides of the sixth or seventh group, at 450° C. The materials are revived by means of hot air, or an inert gas. A suitable composition comprises copper 80 per cent., chromium 20 per cent.

305,027. PURIFYING GAS. O. W. Lusby, 824, Beaumont Avenue, Govans, Baltimore, U.S.A. International Convention date, January 28, 1928.

Sulphur compounds are removed from gases by means of metals of the sixth group or their oxides or hydroxides, in conjunction with metals of the first to fifth or eighth groups or their oxides or hydroxides.

305,033. CATALYTIC APPARATUS. W. Huessy, Aarburg, Switzerland. (Assignee of M. Bals, Bucks, near Aarau, Switzerland.) International Convention date, January 28, 1928.

Apparatus for producing motor spirit by passing a mixture of alcohol and kerosene through molten lead comprises a



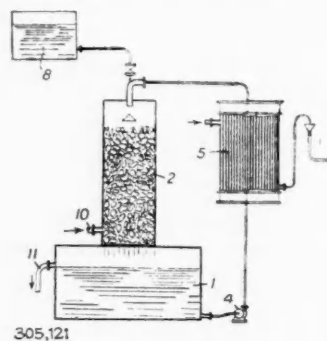
heated casing 2 with reaction tubes 15. The mixture is supplied through a pipe 12 to injectors 14 at the bottom of the tubes 15. The lead filling the casing to level *x* is heated by burners 4, 5, 9. Lead is entrained by the vapour and overflows the top of the tubes 16, while the reaction products pass off at 17. The mixture is preheated by passing through pipe 29 into pipe 27 dipping into molten lead in a casing 21, up to level *y*.

305,092. ELECTROLYSIS. Accumulatoren-Fabrik Akt.-Ges., 3, Askanischer Platz, Berlin. International Convention date, January 30, 1928.

A heavy metal salt is electrolysed using an anode of the metal at a high cathode current density, so that hydrogen instead of metal is liberated at the cathode. The hydroxide of the metal is precipitated in the solution. An example of the treatment of nickel sulphate is given.

305,121. AMMONIUM NITRATE. Appareils et Evaporateurs Kestner, 7, Rue de Toul, Lille, France. International Convention date, January 31, 1928.

Nitric acid is neutralised with ammonia in the presence of excess of ammonium nitrate to prevent overheating. Ammo-



num nitrate solution passes from a tank 1 through pump 4 and cooler 5 to a tower 2 packed with Raschig rings. Nitric acid is added from a tank 8, and ammonia is passed into the base of the tower at 10.

305,132. FERTILISERS. Soc. l'Air Liquide, Soc. Anon. pour l'Etude et l'Exploitation des Procédés G. Claude, 48, Rue St. Lazare, Paris, and E. Urbain, 134, Boulevard Haussmann, Paris. International Convention date, January 31, 1928.

A potassium-ammonium chloride mixture obtained as described in Specification 210,399 (see THE CHEMICAL AGE, Vol. X, p. 334) is treated at 260° C. with phosphoric acid in the proportions of two atoms of phosphorus to one atom of alkali. The product is treated at 150° C. with ammonia till at least one-third of the hydrogen of the phosphoric acid has been replaced. A mixed potassium-ammonium phosphate is thus obtained, and may be treated at 50° C. with ammonia to replace a second hydrogen atom from the phosphoric acid.

305,136. DYES. F. Bensa, 25, Piazza Fontaine Marose, Genoa, Italy. (Assignee of A. Zinke, 30, Castellfeldgasse, Graz, Styria, Austria.) International Convention date, January 31, 1928.

β-Dinaphthol is chlorinated in boiling glacial acetic acid and the product treated with concentrated or fuming sulphuric acid to obtain a vat dye giving heliotrope shades on cotton.

305,140. DYES AND INTERMEDIATES. I.G. Farbenindustrie Akt.-Ges., Frankfurt-on-Main, Germany. International Convention date, January 31, 1928.

*o*-Cyanaryl-sulphocyanogen compounds are submitted to acid hydrolysis by which the cyanide group is replaced by a carboxylic acid amide group. The products are condensed with chloroacetic acid in alkaline solution to give *o*-cyanaryl-thioglycollic acids for the preparation of dyestuffs of the thio-indigo series. In some cases the sulphocyanogen group is replaced by the group—S. CO. NH<sub>2</sub>, which on further hydrolysis by means of the alkali, preferably in the presence of a reducing agent, gives the mercapto group. Examples are given.

305,174. DYES. I.G. Farbenindustrie Akt.-Ges., Frankfurt-on-Main, Germany. International Convention date, February 1, 1928.

A diazotised amine of the benzene series is coupled with a sulphonic acid of 2-phenylindole or a derivative or substitution product. The products give orange and yellow shades on wool.

## LATEST NOTIFICATIONS.

- 307,871. Process for the manufacture of chromed complexes of azo and ortho-oxy-azo dyestuffs. Compagnie Nationale de Matières Colorantes et Manufactures de produits Chimiques du Nord Réunies Etablissements Kuhlmann. March 15, 1928.
- 307,732. Dyeing. Schueller, E. March 12, 1928.
- 307,906. Preparation of diaryl thioureas. Silesia Verein Chemischer Fabriken. March 17, 1928.
- 307,877. Manufacture and production of intaglio printing-colours. I.G. Farbenindustrie Akt.-Ges. March 15, 1928.
- 307,829. Manufacture of artificial fibres. I.G. Farbenindustrie Akt.-Ges. March 14, 1928.
- 307,834. Method of increasing the electrical conductivity of electric arc atmospheres, hot gases, and the like. I.G. Farbenindustrie Akt.-Ges. March 14, 1928.
- 307,881. Production of oxides of zirconium, titanium, and the like. Blumenfeld, J. March 15, 1928.
- 307,798. Process for the production of amines from carboxyl compounds and their derivatives. Knoll Akt.-Ges. Chemische Fabriken, and Schmidt, Dr. K. F. March 13, 1928.
- 307,838. Process for the manufacture of vat dyestuffs of the anthraquinone series. I.G. Farbenindustrie Akt.-Ges. March 14, 1928.
- 307,843. Preheating of ammonia gas in the execution of reactions therewith at elevated temperatures. I.G. Farbenindustrie Akt.-Ges. March 14, 1928.
- 307,926. Manufacture of nitrogen-containing derivatives of the benzanthrone series. I.G. Farbenindustrie Akt.-Ges. March 16, 1928.
- 307,807. Manufacture of artificial threads or the like. I.G. Farbenindustrie Akt.-Ges. March 13, 1928.
- 307,848. Manufacture of viscose products. I.G. Farbenindustrie Akt.-Ges. March 14, 1928.
- 307,890. Production of nitroso-diazo solutions. I.G. Farbenindustrie Akt.-Ges. March 15, 1928.
- 307,936. Manufacture of polymerization products of unsaturated substances. I.G. Farbenindustrie Akt.-Ges. March 16, 1928.
- 307,937. Process for the manufacture of rubber-like products. I.G. Farbenindustrie Akt.-Ges. March 16, 1928.
- 307,938. Process for the manufacture of rubber-like substances. I.G. Farbenindustrie Akt.-Ges. March 17, 1928.

## Specifications Accepted with Date of Application

- 282,107.—Azo dyestuffs, Manufacture of. I.G. Farbenindustrie Akt.-Ges. December 13, 1926.
- 283,948.—Gas purification. Koppers Co. January 22, 1927.
- 285,873. Alkylated guanidine derivatives, Manufacture of. Schering Kahlbaum Akt.-Ges. February 24, 1927. Addition to 279,884.
- 296,074. Potassium manganate, Manufacture of. Soc. des Usines Chimiques Rhone-Poulenc. August 26, 1927. Addition to 292,991.
- 307,723 and 307,947. Vat dyestuffs, Production of. J. Y. Johnson. (I.G. Farbenindustrie Akt.-Ges.) December 10, and September 12, 1927.
- 307,727. 6-alkoxy-8-amino-quinolines, Manufacture of. I.G. Farbenindustrie Akt.-Ges., and A. Carpmal. December 12, 1927. Addition to 267,457.
- 307,728. Compounds containing sulphur, Manufacture of. A. Carpmal. (I.G. Farbenindustrie Akt.-Ges.) December 12, 1927.
- 307,778. Cyanides, Process for the manufacture of. A. Carpmal. (I.G. Farbenindustrie Akt.-Ges.) December 13, 1927.
- 307,808. Artificial rubber, Production of. J. Y. Johnson. (I.G. Farbenindustrie Akt.-Ges.) September 12, 1927.
- 307,945. Butadiene hydrocarbons, Production of. J. Y. Johnson. (I.G. Farbenindustrie Akt.-Ges.) September 10, 1927.
- 307,946. Hydrocarbons, specially those of low boiling point, Manufacture of. J. Y. Johnson. (I.G. Farbenindustrie Akt.-Ges.) September 12, 1927.
- 307,950. Dyestuffs and intermediates, Manufacture of. W. Smith, J. Thomas, and Scottish Dyes, Ltd. October 17, 1927.
- 307,965. Alkali metal salts of nitrosamines of aromatic amines, Manufacture of. O. Y. Imray. (I.G. Farbenindustrie Akt.-Ges.) December 15, 1927.
- 307,985. Recuperation of hydrochloric acid gas from aqueous hydrochloric acid. International Sugar and Alcohol Co., Ltd. (Soc. Industrielle de la Cellulose.) December 21, 1927.
- 307,986. Hydrochloric acid, Recovery of. International Sugar and Alcohol Co., Ltd. (Soc. Industrielle de la Cellulose.) December 21, 1927.
- 308,028. Nitrates, Manufacture of. J. I. Bronn, G. Fischer, and Concordia-Bergbau Akt.-Ges. January 31, 1928.
- 308,049. Anthraquinone derivatives, Manufacture of. British Dyestuffs Corporation, Ltd., and A. Shepherdson. February 15, 1928. Addition to 271,602.

## Applications for Patents

- Abbott, A. V. Process for low-temperature distillations, etc., of bituminous coal. 8,712. March 18.
- Adam, W. G., Gas Light and Coke Co., and Murdoch, D. G. Production of sulphate of ammonia. 9,050. March 20.
- Bataafsche Petroleum Maatschappij and Elkington, H. D. Manufacture of valuable products from ethylene, etc. 8,722. March 18.
- Bayerische Stickstoff-Werke Akt.-Ges. Production of phosphates and hydrogen. 8,776. March 18. (Germany, March 26, '28.)
- Bayerische Stickstoff-Werke Akt.-Ges. Production of phosphoric acid, etc. 8,889, 8,890. March 19. (Germany, March 24, 1928.)
- Becker, A., and Bertelsmann, W. Washing cyanide compounds, etc. 8,726. March 18.
- Boots Pure Drug Co., Ltd., and Pyman, F. L. Production of synthetic drugs. 9,347. March 22.
- Büsching, W. Concentration of sulphuric acid. 9,316. March 22.
- Carpmael, A., and I.G. Farbenindustrie Akt.-Ges. Manufacture of sulphonation products of unsaturated hydroxy fatty acids. 8,748. March 18.
- Carpmael, A., and I.G. Farbenindustrie Akt.-Ges. Manufacture of synthetic rubber. 8,749. March 18.
- Carpmael, A., and I.G. Farbenindustrie Akt.-Ges. Manufacture of 2-amino naphthalene-3-carboxylic acid. 9,025. March 20.
- Carpmael, A., and I.G. Farbenindustrie Akt.-Ges. and Schering Kahlbaum Akt.-Ges. Manufacture of compounds of k-strophanthidin. 8,933. March 19.
- Colquhoun, J. C. Dyeing viscose. 9,416. March 23.
- Du Pont de Nemours and Co., E. I. Catalytic process. 8,782, 8,783. March 18. (United States, May 18, 1928.)
- Foott, C. H., and Graesser-Monsanto Chemical Works, Ltd. Production of phenol. 8,967. March 20.
- I.G. Farbenindustrie Akt.-Ges., and Johnson, J. Y. Production of enamelled wires. 8,677. March 18.
- I.G. Farbenindustrie Akt.-Ges., and Johnson, J. Y. Apparatus for production of esters. 8,708. March 18.
- I.G. Farbenindustrie Akt.-Ges., and Johnson, J. Y. Production of aldehydes. 8,709. March 18.
- I.G. Farbenindustrie Akt.-Ges., and Johnson, J. Y. Manufacture of metal carbonates, etc. 9,021. March 20.
- I.G. Farbenindustrie Akt.-Ges., and Johnson, J. Y. Production of calcium cyanide, etc. 9,162. March 21.
- I.G. Farbenindustrie Akt.-Ges., and Imray, O. Y. Manufacture of azo-dyestuffs. 9,171. March 21.
- I.G. Farbenindustrie Akt.-Ges., and Johnson, J. Y. Cultivation of yeast. 9,285. March 22.
- I.G. Farbenindustrie Akt.-Ges., and Johnson, J. Y. Synthesis of ammonia. 9,286. March 22.
- I.G. Farbenindustrie Akt.-Ges., and Johnson, J. Y. Manufacture of adhesive and binding agents. 9,287.
- I.G. Farbenindustrie Akt.-Ges., and Johnson, J. Y. Manufacture of diaphragms, filter cloths, etc. 9,288. March 22.
- I.G. Farbenindustrie Akt.-Ges., and Johnson, J. Y. Manufacture of vinyl ethers. 9,289. March 22.
- I.G. Farbenindustrie Akt.-Ges., and Imray, O. Y. Manufacture of active masses for alkaline accumulators. 9,308. March 22.
- I.G. Farbenindustrie Akt.-Ges., and Johnson, J. Y. Carrying out polymerizations. 9,419. March 23.
- I.G. Farbenindustrie Akt.-Ges., and Johnson, J. Y. Production of vat dyestuffs. 9,437. March 23.
- I.G. Farbenindustrie Akt.-Ges., and Johnson, J. Y. Production of ethylene from acetylene. 9,438. March 23.
- I.G. Farbenindustrie Akt.-Ges. Production of nitrogenous condensation products from acetylene, etc. 8,676. March 18.
- I.G. Farbenindustrie Akt.-Ges. Manufacture of basic products from imido-ethers of higher fatty acids. 8,720. March 18. (Germany, March 19, 1928.)
- I.G. Farbenindustrie Akt.-Ges. Manufacture of aromatic hydroxy compounds. 8,750. March 18. (Germany, March 19, 1928.)
- I.G. Farbenindustrie Akt.-Ges. Vulcanization of rubber. 9,026. March 20. (Germany, March 20, 1928.)
- I.G. Farbenindustrie Akt.-Ges. Filtration of solutions. 9,036. March 20. (Germany, March 20, 1928.)
- I.G. Farbenindustrie Akt.-Ges. Manufacture of quinizarine sulphonic acid, etc. 9,198. March 21. (Germany, March 22, 1928.)
- I.G. Farbenindustrie Akt.-Ges. Manufacture of  $\gamma$ -substituted quinolines, etc. 9,311. March 22. (Germany, March 22, 1928.)
- I.G. Farbenindustrie Akt.-Ges. Manufacture of vat dyestuffs. 9,448. March 23. (Germany, March 23, 1928.)
- Imperial Chemical Industries, Ltd. Producing finely divided mixtures of solids and gases. 8,969. March 20.
- Imperial Chemical Industries, Ltd. Feeding finely-divided solid material into high-pressure vessels. 9,364. March 22.
- Imperial Chemical Industries, Ltd. Cooling coke. 9,408. March 23.
- Soc. l'Étude Soc. Anon. pour l'Étude et l'Exploitation des Procédés G. Claude. Extraction of ethylene. 9,457. March 23. (France, March 26, 1928.)



## Weekly Prices of British Chemical Products

The prices and comments given below respecting British chemical products are based on direct information supplied by the British manufacturers concerned. Unless otherwise qualified, the figures quoted apply to fair quantities, net and naked at makers' works.

### General Heavy Chemicals

ACID ACETIC, 40% TECH.—£19 per ton.  
 ACID BORIC, COMMERCIAL.—Crystal, £30 per ton; powder, £32 per ton; extra fine powder, £34 per ton.  
 ACID HYDROCHLORIC.—3s. 9d. to 6s. per carboy d/d, according to purity, strength and locality.  
 ACID NITRIC, 80° Tw.—£21 10s. to £27 per ton, makers' works, according to district and quality.  
 ACID SULPHURIC.—Average National prices f.o.r. makers' works, with slight variations up and down owing to local considerations; 140° Tw., Crude Acid, 60s. per ton. 168° Tw., Arsenical, £5 10s. per ton. 168° Tw., Non-arsenical, £6 15s. per ton.  
 AMMONIA ALKALI.—£6 15s. per ton f.o.r. Special terms for contracts.  
 BISULPHITE OF LIME.—£7 10s. per ton, f.o.r. London, packages free.  
 BLEACHING POWDER.—Spot, £9 10s. per ton d/d; Contract, £8 10s. per ton d/d, 4-ton lots.  
 BORAX, COMMERCIAL.—Crystals, £19 10s. to £20 per ton; granulated, £19 per ton; powder, £21 per ton. (Packed in 2 cwt. bags carriage paid any station in Great Britain.)  
 CALCIUM CHLORIDE (SOLID).—£5 to £5 5s. per ton d/d carr. paid.  
 COPPER SULPHATE.—£25 to £25 10s. per ton.  
 METHYLATED SPIRIT 61 O.P.—Industrial, 1s. 3d. to 1s. 8d. per gall. pyridinised industrial, 1s. 5d. to 1s. 10d. per gall.; mineralised 2s. 4d. to 2s. 8d. per gall.; 64 O.P., 1d. extra in all cases.  
 NICKEL SULPHATE.—£38 per ton d/d.  
 NICKEL AMMONIA SULPHATE.—£38 per ton d/d.  
 POTASH CAUSTIC.—£30 to £33 per ton.  
 POTASSIUM BICHROMATE.—4½d. per lb.  
 POTASSIUM CHLORATE.—3½d. per lb., ex-wharf, London, in cwt. kegs.  
 SALAMMONIAC.—£45 to £50 per ton d/d. Chloride of ammonia, £37 to £45 per ton, carr. paid.  
 SALT CAKE.—£3 15s. to £4 per ton d/d. In bulk.  
 SODA CAUSTIC, SOLID.—Spot lots delivered, £15 2s. 6d. to £18 per ton, according to strength; 20s. less for contracts.  
 SODA CRYSTALS.—£5 to £5 5s. per ton, ex railway depots or ports.  
 SODIUM ACETATE 97/98%.—£21 per ton.  
 SODIUM BICARBONATE.—£10 10s. per ton, carr. paid.  
 SODIUM BICHROMATE.—3½d. per lb.  
 SODIUM BISULPHITE POWDER, 60/62%.—£17 10s. per ton delivered for home market, 1-cwt. drums included; £15 10s. f.o.r. London.  
 SODIUM CHLORATE.—2½d. per lb.  
 SODIUM NITRITE, 100% BASIS.—£27 per ton d/d.  
 SODIUM PHOSPHATE.—£14 per ton, f.o.b. London, casks free.  
 SODIUM SULPHATE (GLAUBER SALTS).—£3 12s. 6d. per ton.  
 SODIUM SULPHIDE CONC. SOLID, 60/65.—£13 5s. per ton d/d. Contract, £13. Carr. paid.  
 SODIUM SULPHIDE CRYSTALS.—Spot, £8 12s. 6d. per ton d/d. Contract, £8 10s. Carr. paid.  
 SODIUM SULPHITE, PEA CRYSTALS.—£14 per ton f.o.b. London, 1-cwt. kegs included.

### Coal Tar Products

ACID CARBOLIC CRYSTALS.—6½d. to 6¾d. per lb. Crude 60's, Mar., 1s. 10½d. per gall. April/June, 1s. 10d. per gall.  
 ACID CRESYLIC 99/100.—2s. 3d. to 2s. 10d. per gall. 97/99.—2s. 1d. to 2s. 2d. per gall. Pale, 95%, 1s. 10d. to 1s. 11d. per gall. Dark, 1s. 7½d. to 1s. 8½d.  
 ANTHRACENE.—A quality, 2d. to 2½d. per unit. 40%, £4 10s. per ton.  
 ANTHRACENE OIL, STRAINED.—5½d. to 6d. per gall. for 1080/1090. Unstrained, 6¾d. to 7d. per gall.  
 BENZOLE.—Prices at works: Crude, 10d. to 11d. per gall.; Standard Motor, 1s. 5d. to 1s. 6d. per gall.; 90%, 1s. 7d. to 1s. 8d. per gall.; Pure, 1s. 10d. to 1s. 11d. per gall.  
 TOLUOLE.—90%, 1s. 7½d. to 2s. per gall. Firm. Pure, 2s. to 2s. 2d. per gall.  
 XYLOL.—1s. 5d. to 2s. per gall. Pure, 1s. 8d. to 1s. 9d. per gall.  
 CREOSOTE.—Cresylic, 20/24%, 7½d. to 7¾d. per gall.; Heavy, 6½d. to 6¾d. per gall. Middle oil, 4½d. to 5½d. per gall. Standard specification, 3½d. to 4½d. per gall. ex works. Salty, 7½d. per gall.  
 NAPHTHA.—Crude, 8½d. to 9d. per gall. Solvent, 90/160, 1s. 3½d. to 1s. 4d. per gall. Solvent, 95/160, 1s. 4d. to 1s. 8d. per gall. Solvent 90/190, 1s. 1d. to 1s. 4d. per gall.  
 NAPHTHALENE, CRUDE.—Drained Creosote Salts, £4 10s. to £5 per ton. Whizzed, £5 per ton. Hot pressed, £8 10s. per ton.  
 NAPHTHALENE.—Crystals, £12 5s. to £14 10s. per ton. Quiet Flaked, £14 to £15 per ton, according to districts.  
 PITCH.—Medium soft, 31s. 6d. to 35s. per ton, f.o.b., according to district. Nominal.  
 PYRIDINE.—90/140, 4s. to 4s. 6d. per gall. 90/180, 2s. to 3s. per gall. Heavy, 1s. 6d. to 1s. 9d. per gall.

### Intermediates and Dyes

In the following list of Intermediates delivered prices include packages except where otherwise stated:  
 ACID AMIDONAPHTHOL DISULPHO (1-8-2-4).—10s. 9d. per lb.  
 ACID ANTHRANILIC.—6s. per lb. 100%.  
 ACID BENZOIC.—1s. 8½d. per lb.  
 ACID GAMMA.—4s. 6d. per lb.  
 ACID H.—3s. per lb.  
 ACID NAPHTHIONIC.—1s. 6d. per lb.  
 ACID NEVILLE AND WINTHER.—4s. 9d. per lb.  
 ACID SULPHANILIC.—8½d. per lb.  
 ANILINE OIL.—8d. per lb. naked at works.  
 ANILINE SALTS.—8d. per lb. naked at works.  
 BENZALDEHYDE.—2s. 3d. per lb.  
 BENZIDINE BASE.—3s. 3d. per lb. 100% basis d/d.  
 BENZOIC ACID.—1s. 8½d. per lb.  
 o-CRESOL 29/31° C.—5½d. per lb.  
 m-CRESOL 98/100%.—2s. 3d. to 2s. 6d. per lb.  
 p-CRESOL 32/34° C.—2s. 3d. to 2s. 6d. per lb.  
 DICHLORANILINE.—1s. 10d. per lb.  
 DIMETHYLANILINE.—1s. 11d. per lb.  
 DINITROBENZENE.—8d. per lb. naked at works. £75 per ton.  
 DINITROCHLOROBENZENE.—£84 per ton d/d.  
 DINITROTOLUENE.—48/50° C. 7½d. per lb. naked at works. 66/68° C. 9d. per lb. naked at works.  
 DIPHENYLAMINE.—2s. 10d. per lb. d/d.  
 a-NAPHTHOL.—2s. per lb. d/d.  
 B-NAPHTHOL.—10d. per lb. d/d.  
 a-NAPHTHYLAMINE.—1s. 3d. per lb.  
 B-NAPHTHYLAMINE.—3s. per lb.  
 o-NITRANILINE.—5s. 9d. per lb.  
 m-NITRANILINE.—3s. per lb. d/d.  
 p-NITRANILINE.—1s. 8d. per lb.  
 NITROBENZENE.—6d. per lb. naked at works.  
 NITRONAPHTHALENE.—1s. 3d. per lb.  
 R. SALT.—2s. 2d. per lb.  
 SODIUM NAPHTHIONATE.—1s. 8½d. per lb. 100% basis d/d.  
 o-TOLUIDINE.—8d. per lb.  
 p-TOLUIDINE.—1s. 9d. per lb. naked at works.  
 m-XYLIDINE ACETATE.—2s. 6d. per lb. 100%.  
 N. W. ACID.—4s. 9d. per lb. 100%.

### Wood Distillation Products

ACETATE OF LIME.—Brown, £9 15s. to £10 5s. per ton. Grey, £16 10s. to £17 10s. per ton. Liquor, 9d. per gall.  
 ACETONE.—£78 per ton.  
 CHARCOAL.—£6 to £8 10s. per ton, according to grade and locality.  
 IRON LIQUOR.—1s. 3d. per gall. 32° Tw. 1s. per gall. 24° Tw.  
 RED LIQUOR.—9d. to 10½d. per gall. 16° Tw.  
 WOOD CRESOTE.—1s. 9d. per gall. Unrefined.  
 WOOD NAPHTHA, MISCIBLE.—3s. 8d. to 3s. 11d. per gall. Solvent, 4s. to 4s. 3d. per gall.  
 WOOD TAR.—£3 10s. to £4 10s. per ton.  
 BROWN SUGAR OF LEAD.—£38 per ton.

### Rubber Chemicals

ANTIMONY SULPHIDE.—Golden, 6½d. to 1s. 3d. per lb. according to quality; Crimson, 1s. 4d. to 1s. 6d. per lb., according to quality.  
 ARSENIC SULPHIDE, YELLOW.—1s. 9d. per lb.  
 BARYTES.—£5 10s. to £7 per ton, according to quality.  
 CADMIUM SULPHIDE.—5s. to 6s. per lb.  
 CARBON BISULPHIDE.—£25 to £27 10s. per ton, according to quantity  
 CARBON BLACK.—5½d. per lb. ex wharf.  
 CARBON TETRACHLORIDE.—£45 to £54 per ton, according to quantity, drums extra.  
 CHROMIUM OXIDE, GREEN.—1s. 2d. per lb.  
 DIPHENYLGUANIDINE.—3s. 9d. per lb.  
 INDIARUBBER SUBSTITUTES, WHITE AND DARK.—4½d. to 5½d. per lb.  
 LAMP BLACK.—£32 10s. per ton, barrels free.  
 LEAD HYPOSULPHITE.—9d. per lb.  
 LITHOPONE, 30%.—£23 per ton.  
 MINERAL RUBBER "RUBPRON".—£13 12s. 6d. per ton, f.o.r. London.  
 SULPHUR.—£10 to £12 per ton, according to quality.  
 SULPHUR CHLORIDE.—4d. to 7d. per lb., carboys extra  
 SULPHUR PRECIP. B. P.—£55 to £60 per ton.  
 THIOCARBAMIDE.—2s. 6d. to 2s. 9d. per lb., carriage paid.  
 THIOCARBANILIDE.—2s. 1d. to 2s. 3d. per lb.  
 VERMILION, PALE OR DEEP.—6s. 10d. to 7s. per lb.  
 ZINC SULPHIDE.—8d. to 11d. per lb.

### Pharmaceutical and Photographic Chemicals

ACID, ACETIC, PURE, 80%.—£39 per ton ex wharf London in glass containers.  
 ACID, ACETYL SALICYLIC.—2s. 4d. to 2s. 5d. per lb.  
 ACID, BENZOIC, B.P. 2s. to 3s. 3d. per lb., according to quantity.  
 Solely ex Gum, 1s. 3d. to 1s. 4d. per oz., according to quantity.

ACID, BORIC B.P.—Crystal, 36s. to 39s. per cwt.; powder, 40s. to 43s. per cwt.; extra fine powder, 42s. per cwt., according to quantity. Carriage paid any station in Great Britain, in ton lots.

ACID, CAMPHORIC.—19s. to 21s. per lb.

ACID, CITRIC.—2s. 2d. to 2s. 3d. per lb., less 5%.

ACID, GALLIC.—2s. 8d. per lb. for pure crystal, in cwt. lots.

ACID, PYROGALLIC, CRYSTALS.—7s. 3d. per lb. Resublimed, 8s. 3d.

ACID, SALICYLIC, B.P. PULV.—1s. 5½d. to 1s. 7d. per lb. Technical.—10½d. to 11½d. per lb.

ACID, TANNIC B.P.—2s. 8d. to 2s. 10d. per lb.

ACID, TARTARIC.—1s. 4½d. per lb., less 5%.

ACETANILIDE.—1s. 5d. to 1s. 8d. per lb. for quantities.

AMIDOL.—7s. 6d. to 9s. per lb., d/d.

AMIDOPYRIN.—7s. 9d. to 8s. per lb.

AMMONIUM BENZOATE.—3s. 3d. to 3s. 6d. per lb., according to quantity. 18s. per lb. ex Gum.

AMMONIUM CARBONATE B.P.—£36 per ton. Powder, £39 per ton in 5 cwt. casks. Resublimed, 1s. per lb.

ATROPHINE SULPHATE.—9s. per oz.

BARBITONE.—5s. 9d. to 6s. per lb.

BENZONAPHTHOL.—3s. to 3s. 3d. per lb. spot.

BISMUTH CARBONATE.—9s. 9d. per lb.

BISMUTH CITRATE.—9s. 3d. per lb.

BISMUTH SALICYLATE.—8s. 9d. per lb.

BISMUTH SUBNITRATE.—8s. 3d. per lb.

BISMUTH NITRATE.—Cryst. 5s. 9d. per lb.

BISMUTH OXIDE.—12s. 3d. per lb.

BISMUTH SUBCHLORIDE.—10s. 9d. per lb.

BISMUTH SUBGALLATE.—7s. 9d. per lb. Extra and reduced prices for smaller and larger quantities of all bismuth salts respectively.

BISMUTH ET AMMON LIQUOR.—Cit. B.P. in W. Qts. 1s. 0½d. per lb.; 12 W. Qts. 11½d. per lb.; 36 W. Qts. 11d. per lb.

BORAX B.P.—Crystal, 24s. to 27s. per cwt.; powder, 25s. to 28s. per cwt., according to quantity. Carriage paid any station in Great Britain, in ton lots.

BROMIDES.—Ammonium, 2s. to 2s. 3d. per lb.; potassium, 1s. 8½d. to 1s. 11½d. per lb.; sodium, 1s. 11d. to 2s. 2d. per lb.; granulated, ½d. per lb. less; all spot. Large quantities at lower rates.

CALCIUM LACTATE.—B.P., 1s. 3d. to 1s. 4d. per lb.

CAMPHOR.—Refined flowers, 2s. 11d. to 3s. per lb., according to quantity; also special contract prices.

CHLORAL HYDRATE.—3s. 2d. to 3s. 4d. per lb.

CHLOROFORM.—2s. 5½d. to 2s. 7½d. per lb., according to quantity.

CREOSOTE CARBONATE.—6s. per lb.

ETHERS.—S.G. 730—11d. to 1s. per lb., according to quantity other gravities at proportionate prices.

FORMALDEHYDE, 40%.—37s. per cwt., in barrels, ex wharf.

GUAIACOL CARBONATE.—4s. 6d. to 4s. 9d. per lb.

HEXAMINE.—1s. 11d. to 2s. 2d. per lb.

HOMATROPINE HYDROBROMIDE.—30s. per oz.

HYDRASTINE HYDROCHLORIDE.—English make offered at 120s. per oz.

HYDROGEN PEROXIDE (12 VOLS.).—1s. 4d. per gallon, f.o.r. makers' works, naked. Winchester, 2s. 11d. per gall. B.P., 10 vols., 2s. to 2s. 3d. per gall.; 20 vols., 4s. per gall.

HYDROQUINONE.—3s. 9d. to 4s. per lb., in cwt. lots.

HYPOPHOSPHITES.—Calcium, 2s. 9d. per lb.; potassium, 3s. per lb.; sodium, 2s. 11d. per lb., in 1 cwt. lots, assorted.

IRON AMMONIUM CITRATE.—B.P., 2s. 8d. to 2s. 11d. per lb. Green, 3s. 1d. to 3s. 4d. per lb.; U.S.P., 2s. 9d. to 3s. per lb.

IRON PERCHLORIDE.—18s. to 20s. per cwt., according to quantity.

IRON QUININE CITRATE.—B.P., 8½d. to 9½d. per oz., according to quantity.

MAGNESIUM CARBONATE.—Light commercial, £31 per ton net.

MAGNESIUM OXIDE.—Light commercial, £62 10s. per ton, less 2½%; Heavy commercial, £21 per ton, less 2½%; in quantity lower; Heavy Pure, 2s. to 2s. 3d. per lb.

MENTHOL.—A.B.R. recrystallised B.P., 22s. per lb. net; Synthetic, 11s. to 13s. per lb.; Synthetic detached crystals, 11s. to 16s. per lb., according to quantity; Liquid (95%), 9s. 6d. per lb.

MERCURIALS B.P.—Up to 1 cwt. lots, Red Oxide, crystals, 8s. 4d. to 8s. 5d. per lb., levig., 7s. 10d. to 7s. 11d. per lb.; Corrosive Sublimate, Lump, 6s. 7d. to 6s. 8d. per lb., Powder, 6s. to 6s. 1d. per lb.; White Precipitate, Lump, 6s. 9d. to 6s. 10d. per lb., Powder, 6s. 10d. to 6s. 11d. per lb., Extra Fine, 6s. 11d. to 7s. per lb.; Calomel, 7s. 2d. to 7s. 3d. per lb.; Yellow Oxide, 7s. 8d. to 7s. 9d. per lb.; Persulph, B.P.C., 6s. 11d. to 7s. per lb.; Sulph. nig., 6s. 8d. to 6s. 9d. per lb. Special prices for larger quantities.

METHYL SALICYLATE.—1s. 3d. to 1s. 6d. per lb.

METHYL SULPHONAL.—8s. 9d. to 9s. per lb.

METOL.—9s. to 11s. 6d. per lb. British make.

PARAFORMALDEHYDE.—1s. 9d. per lb. for 100% powder.

PARALDEHYDE.—1s. 4d. per lb.

PHENACETIN.—2s. 5d. to 2s. 8d. per lb.

PHENAZONE.—3s. 9d. to 4s. per lb.

PHENOLPHTHALEIN.—6s. to 6s. 3d. per lb.

POTASSIUM BITARTRATE 99/100% (Cream of Tartar).—97s. per cwt., less 2½ per cent.

POTASSIUM CITRATE.—B.P.C., 2s. 6d. to 2s. 9d. per lb.

POTASSIUM FERRICYANIDE.—1s. 9d. per lb., in cwt. lots.

POTASSIUM IODIDE.—16s. 8d. to 17s. 2d. per lb., according to quantity.

POTASSIUM METABISULPHITE.—6d. per lb., 1-cwt. kegs included f.o.r. London.

POTASSIUM PERMANGANATE.—B.P. crystals, 5½d. per lb., spot.

QUININE SULPHATE.—1s. 8d. to 1s. 9d. per oz., bulk in 100 oz. tins.

RESORCIN.—2s. 10d. to 3s. per lb., spot.

SACCHARIN.—47s. per lb.; in quantity lower.

SALOL.—2s. 3d. to 2s. 6d. per lb.

SODIUM BENZOATE, B.P.—1s. 8d. to 1s. 11d. per lb.

SODIUM CITRATE, B.P.C., 1911.—2s. 3d. to 2s. 6d. per lb., B.P.C. 1923.—2s. 8d. to 2s. 9d. per lb. U.S.P., 2s. 6d. to 2s. 9d. per lb., according to quantity.

SODIUM FERROCYNIDE.—4d. per lb., carriage paid.

SODIUM HYPOSULPHITE, PHOTOGRAPHIC.—£15 per ton, d/d consignee's station in 1-cwt. kegs.

SODIUM NITROPRUSSIDE.—16s. per lb.

SODIUM POTASSIUM TARTRATE (ROCHELLE SALT).—95s. to 100s. per cwt. Crystals, 5s. per cwt. extra.

SODIUM SALICYLATE.—Powder, 2s. 2d. to 2s. 3d. per lb. Crystal, 2s. 3d. to 2s. 4d. per lb.

SODIUM SULPHIDE, PURE RECRYSTALLISED.—10d. to 1s. 1d. per lb.

SODIUM SULPHITE, ANHYDROUS.—£27 10s. to £28 10s. per ton, according to quantity. Delivered U.K.

SULPHONAL.—6s. 6d. to 6s. 9d. per lb.

TARTAR EMETIC, B.P.—Crystal or powder, 2s. 1d. to 2s. 3d. per lb.

THYMOL.—Puriss., 9s. 1d. to 9s. 4d. per lb., according to quantity. Firmer, Natural, 12s. 6d. per lb.

### Perfumery Chemicals

ACETOPHENONE.—6s. 6d. per lb.

AUBEPINE (EX ANETHOL).—11s. per lb.

AMYL ACETATE.—2s. 6d. per lb.

AMYL BUTYRATE.—4s. 6d. per lb.

AMYL SALICYLATE.—2s. 9d. per lb.

ANETHOL (M.P. 21/22° C.).—5s. 3d. per lb.

BENZYL ACETATE FROM CHLORINE-FREE BENZYL ALCOHOL.—1s. 10d. per lb.

BENZYL ALCOHOL FREE FROM CHLORINE.—1s. 10d. per lb.

BENZALDEHYDE FREE FROM CHLORINE.—2s. 6d. per lb.

BENZYL BENZOATE.—2s. 3d. per lb.

CINNAMIC ALDEHYDE NATURAL.—15s. 6d. per lb.

COUMARIN.—8s. 6d. per lb.

CITRONELLOL.—10s. per lb.

CITRAL.—8s. 3d. per lb.

ETHYL CINNAMATE.—6s. per lb.

ETHYL PHTHALATE.—2s. 9d. per lb.

EUGENOL.—13s. 6d. per lb.

GERANIOL (PALMAROSA).—22s. per lb.

GERANIOL.—6s. 6d. to 10s. per lb.

HELIOTROPINE.—5s. per lb.

ISO EUGENOL.—15s. per lb.

LINALOL.—Ex Bois de Rose, 12s. 6d. per lb. Ex Shui Oil, 9s. per lb.

LINALYL ACETATE.—Ex Bois de Rose, 16s. 6d. per lb. Ex Shui Oil Linalol, 10s. per lb.

METHYL ANTHRANILATE.—8s. per lb.

METHYL BENZOATE.—4s. per lb.

MUSK KETONE.—34s. per lb.

MUSK XYLOL.—7s. per lb.

NEROLIN.—3s. 9d. per lb.

PHENYL ETHYL ACETATE.—11s. per lb.

PHENYL ETHYL ALCOHOL.—10s. per lb.

RHODINOL.—52s. per lb.

SAFROL.—2s. per lb.

TERPINEOL.—1s. 6d. per lb.

VANILLIN, EX CLOVE OIL.—18s. 6d. per lb. Ex Geraniol, 15s. 6d. per lb.

### Essential Oils

ALMOND OIL.—Foreign S.P.A., 9s. 6d. per lb.

ANISE OIL.—2s. 9d. per lb.

BERGAMOT OIL.—23s. 6d. per lb.

BOURBON GERANIUM OIL.—21s. per lb.

CAMPHOR OIL.—1s. 3d. per lb.

CANANGA OIL, JAVA.—11s. per lb.

CASSIA OIL, 80/85%.—6s. per lb.

CINNAMON OIL LEAF.—9s. 3d. per oz.

CITRONELLA OIL.—Java, 2s. per lb., c.i.f. U.K. port. Ceylon, pure, 2s. 2d. per lb.

CLOVE OIL (90/92%).—11s. per lb.

EUCALYPTUS OIL, AUSTRALIAN, B.P. 70/75%.—1s. 10½d. per lb.

LAVENDER OIL.—Mont Blanc, 38/40%, 17s. 6d. per lb.

LEMON OIL.—20s. per lb.

LEMONGRASS OIL.—4s. per lb.

ORANGE OIL, SWEET.—26s. 6d. per lb.

OTTO OF ROSE OIL.—Anatolian, 35s. per oz. Bulgarian, 75s. per oz.

PALMA ROSA OIL.—13s. per lb.

PEPPERMINT OIL.—English, 87s. 6d. per lb.; Wayne County, 14s. 3d. per lb.; Japanese, 7s. 6d. per lb.

PETITGRAIN.—10s. per lb.

SANDALWOOD.—Mysore, 28s. per lb.; 90/95%, 18s. 9d. per lb.

## London Chemical Market

The following notes on the London Chemical Market are specially supplied to THE CHEMICAL AGE by Messrs. R. W. Greef & Co., Ltd., and Messrs. Chas. Page & Co., Ltd., and may be accepted as representing these firms' independent and impartial opinions.

London, April 4, 1929.

THE amount of business booked during the current week has been very satisfactory, both for home and export, and prices continue firm.

### General Chemicals

ACETONE is firm at £75 to £85 per ton, according to quantity.  
ACETIC ACID is in steady demand and firm at £36 10s. to £37 per ton for the usual 80% grade.  
ACID CITRIC.—Present prices have been withdrawn and the position is very firm.  
ACID FORMIC is in fair demand and firm at £42 10s. per ton for 85%.  
ACID LACTIC is unchanged at £43 per ton for 50% by weight, technical quality with a fair demand.  
ACID OXALIC is in good demand and firm at £30 10s. to £32 10s. per ton.  
ACID TARTARIC continues firm with a little better demand at 1s. 4½d. per lb. less 5%.  
ALUMINA SULPHATE is still in short supply for early delivery, price unchanged at £7 10s. to £8 per ton.  
AMMONIUM CHLORIDE is firm, with Dog Tooth Crystals in short supply.  
ARSENIC is unchanged at £16 5s. at the mines.  
BARIUM CHLORIDE is unchanged at £11 10s. to £12 per ton for early delivery and still in short supply.  
CREAM OF TARTAR is very firm at £94 to £98 10s. per ton, 99/100% quality.  
COPPER SULPHATE is very firm at the nominal figure of £33 per ton.  
FORMALDEHYDE continues in good demand at £39 per ton.  
LEAD ACETATE continues very firm with an increased demand at £45 per ton for white, and £44 per ton for brown.  
LEAD NITRATE is firm at about £38 per ton.  
LIME ACETATE is unchanged at £18 per ton for the grey quality.  
LITHOPONE.—£19 15s. to £22 per ton.  
METHYL ACETONE.—The improved demand continues with price firm at £58 to £60 per ton.  
POTASSIUM CARBONATE AND CAUSTIC.—Unchanged.  
POTASSIUM CHLORATE is firm at £28 to £30 per ton.

### Nitrogen Products

*Sulphate of Ammonia.*—The market remains firm at £10 2s. per ton f.o.b. U.K. port in single bags. Sales for prompt shipment have been reported at these prices. There have been some lower offerings for forward positions, but as continental producers have not yet announced any forward prices these have been small and are speculative in character.

In the home market large purchases have been reported at the scale prices. It is anticipated that the home consumption will be larger than last year.

*Nitrate of Soda.*—Good sales have been reported from several continental countries. The season is not yet sufficiently far advanced to enable one to form an opinion of the quantity of stock that will be carried over on June 30.

### Latest Oil Prices

LONDON, April 3.—LINSEED OIL was steadier, with a fair inquiry at 2s. 6d. per ton advance. Spot, ex mill, £29; April, £28 5s.; May-August, £28 12s. 6d.; and September-December, £29 5s., naked. RAPE OIL was quiet, crude extracted £42; technical refined, £44, naked, ex wharf. COTTON OIL was dull and occasionally 10s. per ton lower. Egyptian crude, £28; refined common edible, £34; and deodorized, £36, naked, ex mill. TURPENTINE was neglected. American spot, 42s. 9d.; April to June, 43s. per cwt.

HULL.—LINSEED OIL.—Spot to April, £28 7s. 6d.; May-August, £28 12s. 6d.; September-December, £29 per ton, naked. COTTON OIL.—Bombay crude, spot, £27; Egyptian crude, spot (new), March and April, £27 5s.; edible refined, spot, March and April, and technical, spot, £31; deodorized, spot, £33 per ton, naked. PALM KERNEL OIL.—Crushed, 5½ per cent., £35 10s. per ton, naked. GROUNDNUT OIL.—Crushed/extracted, £34; deodorized, £38 per ton. SOYA OIL.—Extracted and crushed, £30 10s.; deodorized, £34 per ton. RAPE OIL.—Crushed/extracted, £42 10s.; refined, £44 10s. per ton. TURPENTINE.—Spot, 45s. per cwt., net cash terms, ex mill. CASTOR OIL and COD OIL unaltered.

PERMANGANATE OF POTASH.—An increased demand at 5½d. per lb. for B.P. with a firm position.  
POTASSIUM PRUSSATE is firm at £63 10s. to £65 10s. per ton with a steady demand.  
SODIUM ACETATE.—£21 5s. to £22 5s. per ton with an active demand and supplies on the short side.  
SODIUM BICHROMATE continues firm at 3½d. per lb. with discounts for quantities.  
SODIUM CHLORATE.—The demand has improved considerably and price steady at £25 per ton.  
SODIUM HYPOSULPHITE is unchanged and the improved demand for the photographic quality continues.  
SODIUM NITRATE is in good demand and steady at £20 per ton.  
SODIUM PHOSPHATE is unchanged at £12 per ton for Dibasic and £17 per ton for Tribasic.  
SODIUM PRUSSATE is unchanged at 4½d. to 5½d. per lb., according to quantity and in fair demand.  
SODIUM SULPHIDE is unchanged and with only a small demand.  
TARTAR EMETIC.—At 10½d. per lb. The improved demand continues, especially for export.  
ZINC SULPHATE is unchanged and firm at £12 10s. per ton.

### Coal Tar Products

The market for coal tar products remains quiet, and there is no change to report in prices from last week.  
MOTOR BENZOL is unchanged at about 1s. 8½d. per gallon f.o.r. makers' works.  
SOLVENT NAPHTHA remains at about 1s. 3d. per gallon, f.o.r. makers' works.  
HEAVY NAPHTHA is quoted at 1s. 3d. per gallon on rails.  
CREOSOTE OIL is still weak, and is quoted at 4½d. per gallon on rails in the North, and at 5½d. per gallon in London.  
CRESYLIC ACID remains unchanged, the 98/100% quality being quoted at about 1s. 10d. per gallon, and the dark quality 95/97% at about 1s. 7d. per gallon f.o.r.  
NAPHTHALENES.—The firelighter quality remains at about £4 10s. per ton, the 74/76 quality at £5 per ton, and the 76/78 quality at £6 to £6 5s. per ton.  
PITCH is unchanged, at 30s. to 32s. 6d. per ton f.o.b.

### South Wales By-Products

SOUTH Wales by-product activities are unchanged. Business generally is on very quiet lines and prices are easier. Road tar has a slightly better call, but values are unchanged round 10s. to 13s. per 40-gallon barrel. Pitch, in view of the weakness of patent fuel, has only a small demand, and prices are easy round 32s. 6d. to 35s. per ton, delivered, and 31s. to 32s. per ton f.o.b. Motor benzol continues to be a strong feature, but creosote has gone further back. Crude naphthalene, quoted round 80s. per ton, has scarcely any call, and a similar remark applies to whizzed at about 100s. per ton. Refined tars have a fair demand, but values are unchanged. Coke oven tar is quoted at from 7d. to 7½d. per gallon delivered, and gasworks tar at from 6½d. to 6¾d. per gallon delivered. Patent fuel exports remain poor, but prices are unchanged, ex-ship Cardiff quotations being 21s. to 21s. 6d. per ton, and ex-ship Swansea 19s. 3d. to 19s. 9d. per ton. Coke prices are:—Good foundry, 26s. 6d. to 32s. 6d.; best foundry, 32s. 6d. to 36s. 6d., and furnace from 19s. to 21s. per ton.

### The Canadian Distilling Industry

THE Dominion Bureau of Statistics at Ottawa has forwarded to the High Commissioner for Canada in London a report on the distilled liquor industry in Canada, giving figures for the years 1926 and 1927. The report in question covers the operations of 15 individual plants in 1926 and 17 in 1927, most of which were in Ontario and Quebec, though 3 were operating in British Columbia and 2 in Manitoba. The total capitalisation of the distilleries in 1927 was \$37,528,954, and the 1,401 employees earned wages and salaries aggregating \$1,895,084. Materials costing \$6,351,698 were used, the gross value of products being \$25,860,985. The total production of spirits in 1927 was 11,483,360 proof gallons, as compared with 7,318,320 proof gallons in 1926, an increase of 4,165,040 gallons, or 56.91 per cent. Potable spirits increased from 4,179,242 proof gallons in 1926 to 9,025,180 proof gallons in 1927, or 116 per cent, whilst the production of industrial and commercial alcohols fell from 3,139,278 gallons in 1926 to 2,458,180 gallons in 1927, or a percentage decrease of 21.7.



## Scottish Chemical Market

*The following notes on the Scottish Chemical Market are specially supplied to THE CHEMICAL AGE by Messrs. Charles Tennant and Co., Ltd., Glasgow, and may be accepted as representing the firm's independent and impartial opinions.*

Glasgow, April 3, 1929.

DURING the past week business in the heavy chemical market has been rather slack, no doubt due to the vacation, but there is a fair amount of inquiry on hand, and the indication of better trade, which has been noticed since the beginning of the year, would seem to be justified.

### Industrial Chemicals

- ACETONE, B.G.S.—£76 10s. to £85 per ton, ex wharf, according to quantity. Inquiry remains satisfactory.
- ACID ACETIC.—98/100% glacial, £56 to £67 per ton according to quality and packing, c.i.f. U.K. ports; 80% pure, £37 10s. per ton, ex wharf; 80% technical, £37 10s. per ton, ex wharf.
- ACID BORIC.—Crystals, granulated or small flakes, £30 per ton; powder £38 per ton packed in bags carriage paid U.K. stations. There are few fairly cheap offers made from the Continent.
- ACID CARBOLIC, ICE CRYSTALS.—Unchanged at 6½d. per lb. delivered or f.o.b. U.K. ports.
- ACID CITRIC B.P. CRYSTALS.—Quoted 2s. 2½d. per lb. less 5%, ex store, spot delivery. Offered at 2s. 2½d. per lb., less 5%, ex wharf, prompt shipment from the Continent.
- ACID HYDROCHLORIC.—Usual steady demand. Arsenical quality, 4s. per carboy. Dearsenicated quality 5s. 6d. per carboy, ex works, full wagon loads.
- ACID NITRIC, 80° QUALITY.—£24 10s. per ton, ex station, full truck loads.
- ACID OXALIC, 98/100%.—Price remains unchanged at about 3½d. per lb., ex store. Offered for prompt shipment from the Continent at 3½d. per lb., ex wharf.
- ACID SULPHURIC.—£2 15s. per ton, ex works for 144° quality, £5 15s. per ton for 168° quality. Dearsenicated quality, 20s. per ton extra.
- ACID TARTARIC B.P. CRYSTALS.—Spot material now quoted 1s. 4½d. per lb., less 5%, ex wharf.
- ALUMINA SULPHATE.—Spot material rather dearer at about £6 per ton, ex store. For prompt shipment £5 15s. per ton, c.i.f. U.K. ports.
- ALUM, LUMP POTASH.—Unchanged at about £8 12s. 6d. per ton, c.i.f. U.K. ports. Crystal meal offered on spot at £9 per ton, ex store.
- AMMONIA ANHYDROUS.—Quoted 9½d. per ob., carriage paid. Containers extra and returnable.
- AMMONIA CARBONATE.—Lump quality quoted £36 per ton. Powdered £38 per ton, packed in 5 cwt. casks, delivered U.K. stations or f.o.b. U.K. ports.
- AMMONIA LIQUID, 880°.—Unchanged at about 2½d. to 3d. per lb., delivered according to quantity.
- AMMONIA MURIATE.—Grey galvanisers crystals of British manufacture quoted £21 to £22 per ton, ex station. Fine white crystals offered from the Continent at about £17 5s. per ton, c.i.f. U.K. ports.
- ANTIMONY OXIDE.—Now quote £37 10s. per ton, c.i.f. U.K. ports, prompt shipment from China. Spot material still on offer at £40 per ton, ex store.
- ARSENIC, WHITE POWDERED.—Unchanged at £18 5s. per ton, ex wharf, prompt despatch from mines. Spot material quoted £19 15s. per ton, ex store.
- BARIUM CHLORIDE.—Quoted £10 10s. per ton, c.i.f. U.K. ports, prompt shipment.
- BLEACHING POWDER.—British manufacturers contract price to consumers unchanged at £6 12s. 6d. per ton, delivered in minimum 4-ton lots. Continental now offered at about the same figure.
- CALCIUM CHLORIDE.—Remains unchanged. British manufacturers price, £4 5s. to £4 15s. per ton, according to quantity and point of delivery. Continental material on offer at £3 12s. 6d. per ton, c.8.f. U.K. ports.
- COPPERAS, GREEN.—Unchanged at about £3 10s. per ton, f.o.r. works or £4 12s. 6d. per ton, f.o.b. U.K. ports.
- FORMALDEHYDE, 40%.—Good inquiry and price unchanged at about £37 10s. per ton, ex store.
- GLAUBER SALTS.—English material quoted £4 10s. per ton, ex station. Continental on offer at about £3 5s. per ton, ex wharf.
- LEAD, RED.—On offer at £29 15s. per ton, ex store.
- LEAD, WHITE.—Quoted £37 10s. per ton, c.i.f. U.K. ports.
- LEAD ACETATE.—White crystals quoted £41 10s. per ton. Brown on offer about £39 10s. per ton, ex store.
- MAGNESITE, GROUND CALCINED.—Quoted £8 10s. per ton, ex store. In moderate demand.
- METHYLATED SPIRIT.—Industrial quality 64 O.P. quoted 1s. 4d. per gallon, less 2½% delivered.
- POTASSIUM BICHROMATE.—Quoted 4½d. per lb. delivered U.K. or c.i.f. Irish ports, with an allowance of 2½% for minimum 2½ tons to be taken.
- POTASSIUM CARBONATE 96/98%.—Spot material now quoted £26 10s. per ton, ex store. Offered from the Continent £25 10s. per ton c.i.f. U.K.
- POTASSIUM CHLORATE 99½/100%.—Powder quoted £25 10s. per ton, ex wharf. Crystals 30s. per ton extra.
- POTASSIUM NITRATE.—Refined granulated quality quoted £19 2s. 6d. per ton, c.i.f. U.K. ports. Spot material on offer at about £20 10s. per ton, ex store.
- POTASSIUM PERMANGANATE, B.P. CRYSTALS.—Quoted 5½d. per lb., ex wharf.
- POTASSIUM PRUSSIAN (YELLOW).—Offered for prompt shipment from the Continent at 6½d. per lb., ex wharf. Spot material quoted 7d. per lb., ex store.
- SODA CAUSTIC.—Powdered 98/99%. Now £17 10s. per ton in drums, £18 15s. per ton in casks. Solid 76/77%, £14 10s. per ton in drums. 70/72%, £14 2s. 6d. per ton in drums, all carriage paid buyers' stations, minimum 4 ton lots, for contracts 10s. for ton less.
- SODIUM ACETATE, 65%.—Crystal quality quoted about £19 15s. per ton, ex wharf. 73/78% Anhydrous quality on offer at £20 per ton carriage paid buyers' stations.
- SODIUM BICARBONATE.—Refined recrystallised, £10 10s. per ton, ex quay or station. M.W. quality, 30s. per ton less.
- SODIUM BICHROMATE.—3½d. per lb., delivered U.K. or c.i.f. Irish ports, less 2½% for contract, minimum 2½ tons.
- SODIUM CARBONATE (SODA CRYSTALS).—£5 to £5 5s. per ton, ex quay or station. Powdered or pea quality 27s. 6d. per ton extra. Light soda ash, £7 1s. 3d. per ton, ex quay, minimum 4 ton lots with various reductions for contracts.
- SODIUM HYPOSULPHITE.—Large crystals of English manufacture quoted £8 17s. 6d. per ton, ex station, minimum 4 ton lots. Pea crystals on offer at £14 15s. per ton, ex station, minimum 4 ton lots. Prices for this year unchanged.
- SODIUM NITRATE.—Ordinary quality quoted £10 12s. per ton, carriage paid buyers' sidings, minimum 6 ton lots; usual extras for small quantities and refined qualities.
- SODIUM SULPHATE (SALTCAKE).—Prices 50s. per ton, ex works, 52s. 6d. per ton delivered for unground quality. Ground quality, 2s. 6d. per ton extra.
- SODIUM SULPHIDE.—Prices for home consumption: solid, 60/62%, £9 per ton; broken, 60/62%, £10 per ton; crystals, 30/32%, £7 2s. 6d. per ton, delivered buyers' works on contract, minimum 4 ton lots. Special prices for some consumers. Spot material, 5s. per ton extra.
- SULPHUR.—Flowers, £12 per ton; roll, £10 10s. per ton; rock, £10 7s. 6d. per ton; ground American, £9 5s. per ton, ex store.
- ZINC CHLORIDE 98%.—British material now quoted £22 10s. per ton f.o.b. U.K. ports.
- ZINC SULPHATE.—Offered from the Continent at about £10 5s. per ton, ex wharf.

*Note.*—The above prices are for bulk business and are not to be taken as applicable to small parcels.

### Japanese Ammonium Sulphate Situation

ACCORDING to Japanese foreign trade statistics for 1926, Germany provided 300,000 tons, or 60 per cent. of Japanese imports of ammonium sulphate, the United States taking second place with 20 per cent. of the total, and Great Britain third, with 13 per cent. In 1927 the relation changed in favour of Great Britain, the German imports having declined to 81,673 tons, according to German statistics. Japanese production of ammonium sulphate is developing steadily. In 1927 it amounted to 180,000 tons, which was 34,000 tons more than during the preceding year. The total consumption is estimated at 500,000 tons. The future of the Japanese market for ammonium sulphate is influenced by the erection of large plants by the Japan Nitrogen Co., in Chosen, equipped for an annual production of 250,000 tons. These plants (like others in Japan) will work the Casale process. All the new plants, operating at capacity, would provide for the Japanese consumption of ammonium sulphate.

## Manchester Chemical Market

(FROM OUR OWN CORRESPONDENT.)

Manchester, April 4, 1929.

OPERATIONS on the chemical market during the past week have naturally been on a severely restricted scale in consequence of the holidays, and when business was resumed on Tuesday a pretty large residue of the holiday spirit was in evidence. It is expected, however, that by the beginning of next week conditions will be more or less normal. Meanwhile, buying interest is of moderate extent.

### Heavy Chemicals

The demand in the case of phosphate of soda this week has been inactive and offers of this material are now down to about £11 15s. per ton. For prussiate of soda there has been a moderate amount of inquiry about and prices are fully maintained at from 4½d. to 5d. per lb., according to quantity. Quotations for sulphide of sodium are on a reasonably steady basis although there is not a great deal of business about at the moment; the 60/65 per cent. concentrated solid quality is offered at about £9 10s. per ton and the commercial material at £8. A fair demand is being experienced for caustic soda at the old range of contract prices, namely, from £12 15s. to £14 per ton, according to quality. Alkali, also, is being disposed of in fairly satisfactory quantities at about £6 per ton. A quiet trade is passing in the case of hyposulphite of soda and values in this section show little change on the week, the commercial grade being on offer at round £9 per ton and the photographic at from £15 5s. to £15 10s. Saltcake keeps pretty steady at up to £2 15s. per ton, though the demand for this is on somewhat moderate lines. Bichromate of soda is well held and a quietly steady business is being put through on the basis of 3½d. per lb. With regard to bicarbonate of soda, sales are maintained at a fair level and quotations keep very firm at round £10 10s. per ton. Current offers of chlorate of soda are still in the neighbourhood of 2½d. per lb., with buying interest at the moment rather slow.

A quiet business has been reported this week in permanganate of potash, with the B.P. grade obtainable at about 5½d. per lb. and the commercial product at 5d. to 5½d. Yellow prussiate of potash meets with some inquiry and values are very firm at from 6½d. to 7½d. per lb., according to quantity. Both carbonate of potash and caustic potash are attracting a fair amount of attention from buyers and prices are steady in each case at round £26 5s. per ton for the carbonate and from £33 5s. per ton for prompt delivery of one to five-ton lots for caustic. Chlorate of potash is steady at from 3d. to 3½d. per lb., although only in comparatively limited request just now. With regard to bichromate of potash, moderate sales are reported and values are fully maintained on the basis of 4½d. per lb.

Sulphate of copper is well held at the recent advance, but buying interest is rather patchy; for April delivery current quotations are at round £31 10s. per ton, f.o.b. Offers of arsenic range from about £16 to £16 5s. per ton, at the mines, for white powdered, Cornish makes; inquiry at the moment, however, is not particularly active. The lead compounds keep firm at the higher levels, with nitrate quoted at from £35 to £36 per ton and the acetates at about £42 10s. per ton for white and £41 10s. for brown. The acetates of lime are on the slow side, but prices are steady at about £17 per ton for the grey quality and from £8 15s. to £9 for the brown.

### Acids and Tar Products

There is a quiet demand about for oxalic acid which remains fairly steady at round £1 11s. 6d. per cwt. Both citric and tartaric acids appear to be well held at 2s. 2½d. and 1s. 4½d. to 1s. 4½d. per lb., respectively, and a moderate business is being transacted. Acetic acid is firm and in fair request at about £36 per ton for the 80 per cent. commercial product and £66 per ton for the glacial quality.

Pitch still fails to attract any marked attention from buyers and prices are largely nominal at round £1 12s. 6d. per ton, f.o.b. Creosote oil is easy in tendency at 3½d. per gallon, naked, and the demand continues slow. Solvent naphtha is in moderate request with offers varying from 1s. 2½d. to 1s. 3d. per gallon. Carbolic acid crystals are firm and in fair demand at up to 6½d. per lb., f.o.b., with crude 60's quoted at from 1s. 9d. to 1s. 10d. per gallon, naked, according to delivery position.

## Company News

BURT, BOULTON AND HAYWOOD.—An interim dividend of 5%, less tax, on the ordinary shares, is announced.

ARIZONA COPPER CO.—A meeting of the company has been called for April 10, when a resolution to put the company into voluntary liquidation and to appoint Mr. William Rintoul, the secretary, as liquidator, will be submitted.

THARSIS SULPHUR AND COPPER CO.—The net profit for the year ended December 31, 1928, is £122,029, against £73,088 for 1927. Adding £85,110 brought forward, there is £207,139. The directors recommend that a general reserve account be created, and that £25,000 be appropriated thereto, payment of a dividend of 4s. per share, equal to 10 per cent., less income tax, against 8½ per cent. last year, payable on and after May 10 next, absorbing £100,000, and that £82,139 be carried forward. It is also proposed that £10,000 standing at the credit of reserve insurance fund account be transferred to the credit of the general reserve account.

WRIGHT, LAYMAN AND UMNEY.—The report for the year ended December 31, 1928, states that the accounts show that, after providing for directors' salaries as departmental managers, staff bonus, bad debts, depreciations, pensions and income tax, there is a trading profit, including income from investments, of £43,843. Adding the amount brought forward of £10,170, there remains £54,014. The directors' fees require £4,400, and board recommend a further dividend of 15 per cent. on ordinary shares, making 25 per cent. for year, less income tax at 4s., together with a bonus of 3s. per share on ordinary shares, less income tax at 4s., carrying forward £16,494.

RECKITT AND SONS, LTD.—Presiding at the annual meeting of shareholders on March 27, the Rt. Hon. T. R. Ferens said it was entirely fallacious, as suggested in the financial Press, to state they had lost something like £100,000 on the past year's trading compared with the previous year. As a matter of fact, the past year had been a record, both in regard to tonnage and sterling, the additional profit amounting to £51,000. They had consequently been able to maintain the ordinary dividend at 21½ per cent. and to pay 5 per cent. on the second preference bonus shares issued a year ago, and to set aside £101,000 for distribution among members of the staff and other employees. During the past year, he continued, competitive businesses had been acquired in Australia and South America, and a factory in Suffolk had been also secured for the manufacture of one of the raw materials used in the company's products. Further extensions of business had taken place in Spain, where a factory for the manufacture of ultramarine had been purchased.

### Tariff Changes

CZECHOSLOVAKIA.—Magnesium sulphate may be imported into Czechoslovakia by factories for the production of artificial silk on payment of the reduced rate of duty of 14·4 Czech kronen per 100 kilos., subject to special permission having been obtained from the Ministry of Finance.

### Diphenyl for Heat Transmission

THE Federal Phosphorus Co., of the United States, announces the production of diphenyl (C<sub>6</sub>H<sub>5</sub>-C<sub>6</sub>H<sub>5</sub>) on a commercial scale sufficient to supply the requirements of one of the oil refiners for refining lubricating oils. The use of diphenyl in boilers in place of water is said to permit of high temperatures at low pressures, making it possible to maintain temperatures of 750° Fahr. with a pressure of only 115 lb. Material which has been subjected to these conditions for several months has shown no tendency to decompose. Thus it offers the possibility of solving problems of distillation and evaporation in connection with products involving high temperatures. In addition to the refining of lubricating oils it offers possibilities in the evaporation of high boiling solutions such as calcium chloride and caustic soda; the distillation of high-boiling organic chemicals; the distillation of fatty acids; and the bodying of gums and oils for varnishes and printing inks.



## Foamite Generators in three types

For medium size and small oil tanks—for single tanks or tanks in groups of two or three—in fact, for any tank or tanks where a two-solution Foamite System may be too extensive for economical operation—the Foamite Generator offers the next best form of protection.

Foamite Generators are made in different sizes. One Model 15 will protect a tank of 25 feet diameter. One Model 25 will protect a 45 feet diameter tank. One super generator, Model 30, will protect a tank of 65 feet diameter. Two or more super generators will protect larger tanks.

These ratings are conservative as dictated by sound engineering practice. This policy of conservatism, together with high standards of design, construction and workmanship, has been responsible for the success of the Foamite method of fire extinguishment.

For further particulars as to how Foamite Generators can protect your particular risk, apply to FOAMITE FIREFOAM LTD., 55/57, Great Marlborough Street, London, W.1.

Telephone:  
REGENT 3105 6 7.

Telegrams:  
FOAMITE WESDO  
LONDON.

# FOAMITE FIRE PROTECTION

A Complete Engineering Service  
For Extinguishing Fires



## Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

### County Court Judgments

[NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court judgments against him.]

MULTICOLOURS, LTD., Joules Court, Waterloo, Stockport, dye manufacturers. (C.C., 6/4/29.) £18 1s. 10d. October 30.

PURUS, LTD., 52, High Street, Brentford, paint manufacturers. (C.C., 6/4/29.) £18 17s. 6d. February 21.

### Mortgages and Charges

[NOTE.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case, the total debt, as specified in the last available Annual Summary, is also given—marked with an \*—followed by the date of the Summary, but such total may have been reduced.]

NITRO-CELLULOSE EXPLOSIVES CO., LTD., London, W.C. (M., 6/4/29.) Registered March 13, £1,000 and £100 debentures, parts of £12,500; general charge.

PHILLIPS (ROBERT W.), LTD., London, W.C., soap makers. (M., 6/4/29.) Registered March 15, £325 debenture, to R. W. Phillips, 34, Cartwright Gardens, W.C.; general charge. \*Nil. March 17, 1928.

### Satisfaction

MELLOR BLEACHING CO., LTD. (M.S., 6/4/29.) Satisfaction registered March 14, £3,550, registered November 26, 1909, and £6,550, registered April 6, 1910.

### London Gazette, &c.

#### Companies Winding Up Voluntarily

GAY (R.) AND CO., LTD. (C.W.U.V., 6/4/29.) By special resolution, March 6, confirmed March 21, A. White, 26-27, Bush Lane, Cannon Street, London, E.C.4, appointed liquidator. Meeting of creditors at the offices of the liquidator, April 11, at 11 a.m. All creditors have been, or will be, paid in full.

PEELMONT ART SILK BLEACHERS, LTD. (C.W.U.V., 6/4/29.) By reason of its liabilities, March 23, A. C. Bowden, 29, Corporation Street, Manchester, Certified Accountant, appointed as liquidator. Meeting of creditors at the rooms of the Manchester Geological and Mining Society, 5, John Dalton Street, Manchester, on Wednesday, April 10, at 12 noon.

TABOR, TREGO AND CO., LTD. (C.W.U.V., 6/4/29.) By special resolution, March 6, confirmed March 27, A. White, 26-27, Bush Lane, Cannon Street, London, E.C.4, appointed liquidator. Meeting of creditors at the offices of the liquidator, April 11, at 11.30 a.m. All creditors have been, or will be, paid in full.

### New Companies Registered

COUNTY CHEMICAL CO., LTD., 54, Bradford Street, Birmingham. Registered March 26. Nominal capital, £50,000 in £1 shares (12,500 6 per cent. cumulative preference and 37,500 ordinary.) To acquire the business carried on in England by the County Chemical Co., Ltd., and to carry on the business of manufacturing chemists, druggists, drysalts, oil and colour men, etc. Directors: W. Hill, L. C. Hill, and W. N. Hill.

JOHN HENSHAW AND CO., LTD., 5, Green Lane, Brook Street, Manchester. Registered April 2. Nominal

capital, £7,000 in 6,000 7 per cent. cumulative preference and 1,000 ordinary shares of £1 each. To acquire the business of soap manufacturers, boilers, merchants and contractors carried on at Green Lane, Manchester, as "John Henshaw and Co." Directors: J. Henshaw, R. P. Henshaw and J. R. Henshaw.

B. SMARTS, LTD., Castle Mills, Green Street, Northampton. Registered March 30. Nominal capital, £50 in £1 shares. To carry on the business of general dyers and cleaners, chemical and by-product manufacturers, etc. Directors: G. E. Elliott, P. J. Turner.

### The Production of Xylose Hundred-Pound-a-Day Plant

THE Alabama Polytechnic Institute and the University of Alabama, co-operating through the Alabama Industrial Development Board, have arranged to work with the United States Bureau of Standards in the erection and operation of a small factory in which experiments can be made on the recovery of xylose from cotton-seed bran and peanut shells.

Xylose at present is a rare sugar possessing properties which ought to make it a desirable material for use in the food, textile, and leather industries. Its investigation is part of an extensive research programme which the Bureau is conducting with the object of discovering new uses for the waste products of agriculture. This work does not stop with the production of a marketable material in the laboratory, but includes the discovery of profitable ways to dispose of this material. Therefore, the Bureau has found it necessary to build small factories in which the laboratory processes can be tried out on a production basis, thus making it possible to determine manufacturing costs with some degree of assurance. These small plants are useful in another way as well. They make possible the production of enough material to be actually used by likely consumers in their own plants, so that markets for the product may be explored. Thus, in the case of xylose, it seems probable that it will find a ready market in the industries mentioned, but there is no way to answer this question definitely while it is a laboratory curiosity. The erection of the plant at Anniston, with a capacity of 100 pounds of xylose per day with a manufacturing cost probably not exceeding fifty cents per pound, should soon give definite information on the subject.

### United States Engineering Index

THE Engineering Index Service, instituted in January, 1928, is to be found in the public libraries of Newark, Cleveland, Bridgeport, Baltimore, the John Crerar Library, Chicago, and other centres. As an example of its range it may be mentioned that THE CHEMICAL AGE is fully indexed—every issue, as soon as published—in a set of cards, which thus brings ready to hand any article on any subject in this journal or in any one of 1,700 other journals in all languages. Engineers in any field who live or work in New Jersey, U.S.A., will find this mammoth index to the latest engineering literature also in the Public Library of Newark, N.J., which has THE CHEMICAL AGE on file. The library is open daily from 9 a.m. to 9.30 p.m. It is convenient to all railroad stations. It answers inquiries by mail or by telephone.

### Chemical Trade Inquiries

The following inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.

CAUSTIC SODA AND CRYSTAL SODA.—The Egyptian Ports and Lighthouses Administration is inviting tenders (to be received by the Director General, Ports and Lighthouses Administration, Alexandria, up to noon on April 20) for 800 kilos of caustic soda and 3,500 kilos of crystal soda. (Reference C. 3008.)

COPPER SULPHATE AND CAUSTIC SODA.—A well-established firm at Porto Alegre, Brazil, wishes to get in touch with British exporters. (Reference No. 271.)

nd  
of  
ors  
aw  
R.

ap-  
41  
ers,  
rs :

of  
De-  
ited  
of a  
very

ties  
the  
is  
eau  
the  
with  
ory,  
his  
to  
be  
to  
ace.  
ney  
ally  
ets  
ose,  
the  
his  
The  
nds  
not  
ite

28,  
nd,  
go,  
be  
ery  
ngs  
or  
ers  
nd  
lso  
HE  
m.  
It

ade  
ade  
.I.  
ers  
nd

rts  
be  
ni-  
los  
ce

ed  
th